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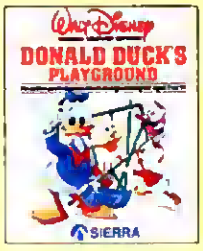

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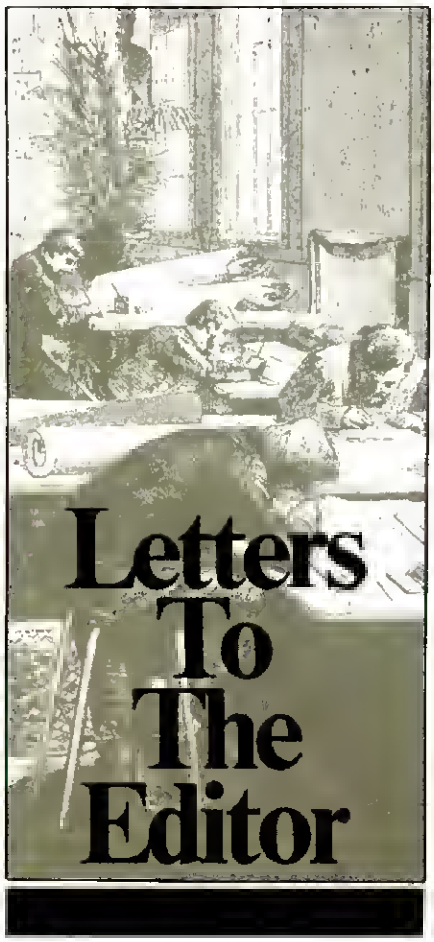

Letters To The Editor

Power Without The Price European Style

Dear Editor:

I arrived here in West Germany a week ago, and I expect my 520ST and peripherals to arrive shortly.

As you know, Europe operates at 220 volts; my power supplies are all 110 volts. Can you tell me where to get new 220-volt power supplies for my equipment?

SFC Allen C. Piper
HHC, 1/39 Inf.
APO NY 09034

Atari does not recommend the transplanting of U.S. machines abroad or vice versa. In addition to the problem you are already facing, Atari points out that you will be unable to get spare parts if something goes wrong with the machine while you are in Europe. Neil Harris suggests that Atarians who plan to travel or live abroad try to borrow a computer for the duration of their stay or buy a native machine and then sell it when they return to the States. He reports that there is a good market for used hardware overseas.

If you do decide to take your Atari with you, a standard step-down transformer for each component of your system will solve the problem of power supply. Ataris manufactured for the overseas market are sufficiently different from U.S. models on the inside that simply changing the power supply will not work and may even damage your computer.

BBS Reborn

Dear Editor:

I would like to let your readers know of the rebirth of the Central Area BBS. Primarily for Atari ST users, the BBS is located in Biloxi, MS. It runs on a 1Mb 520ST with an Atari 20Mb hard disk and operates 24-hours a day, seven days a week at 300, 1200, and 2400 baud.

The board is sponsored by the Coastal Area Atari Users' Group and offers a message forum and public domain software. Several of those associated with the board are Plato programmers, and we would like to serve as a central point for communication among Plato users.

The phone number for the BBS is (601) 388-3490.

David E. Warner
P.O. Box 5098
Biloxi, MA 39534

Beginner's Plea

Dear Editor:

I would like to know how to enter some of the programs in your magazine, but I don't know how and don't find any explanation in your pages.

Please forgive a beginner. I need to know how to start, how to save those programs.

Joseph J. Weinmeyer
3101 Townview Ave. N.E.
Minneapolis, MN 55418

It's easy to type in and enjoy the Basic programs for Atari 8-bit home computers that appear in each issue of Atari Explorer. Just follow the steps below:

1. The first step should be to confirm that the program you want to type in is designed to run on your computer system. All Atari 8-bit home computers (400/800/1200XL/600XL/800XL/65XE/130XE) are fundamentally compatible with one another, but differ in minor technical details and RAM memory allotment. Occasionally, therefore, a Basic program written for one system may not run on another. Moreover, a given program may require certain peripherals (disk drive, modem, printer, joystick, graphics tablet, etc.) to run; if these are not part of your system, there is little point in typing in a program that requires them.

Starting with this issue of *Explorer*, each program listing will be accompanied by a box, the Atari Key, telling which computers it will run on, what language it is written in, and which special add-ons and peripherals, if any, it requires. Check the key carefully so that you don't spend valuable time trying to type in a program you won't be able to use.

2. If you own a disk drive, format a blank disk for saving your program. Your disk drive or DOS manual will tell you how. After formatting, it is convenient to employ the WRITE DOS FILES option on the DOS menu to put DOS on the disk, making it "bootable." This way, you can avoid using a separate DOS disk to start your system.

3. To prepare for programming in Basic, Atari 400 and 800 owners will have to plug an Atari Basic cartridge into the internal cartridge port (the left-hand port on the 800). Other Atari 8-bit

models have Basic built-in, so no special preparation is necessary.

4. Turn on your disk drive (if you own one) and insert the disk you prepared in step 2, above (or any other bootable disk).

5. Turn on your computer. If you own a disk drive, it should whir for a few moments. Then, a READY prompt should appear on an otherwise clear screen. Note to Atari XL and XE owners with disk: do not hold down the Option key during this process, as this will bypass the built-in Basic.

Once the Basic READY prompt is on the screen, you are ready to start typing.

6. A Basic program consists of many "lines" of text, each preceded by a line number. In typing in a Basic program, your main task is to duplicate the content of each program line (including the line number) exactly.

Each program line is a logical unit, containing from one to several instructions for the computer to perform. It may "run over" onto more than one physical line both on the printed page and on your computer screen. In program typing, the RETURN key is not used until you reach the very end of a logical program line, as distinct from a physical line on the page or on your screen.

7. When you have finished typing in your program, save it on disk or cassette. This can be accomplished by typing:

SAVE "D:filename" for disk, or

SAVE "C:filename" for cassette,

substituting a filename of your choice.

8. Finally, test the program by typing RUN. If it works, congratulations! If it doesn't, you have probably made one or more typing errors. Check your manual for instructions on how to edit Basic programs, go back, fix your mistakes, and save a new copy of the program on disk or cassette.

The instructions given above should help to get you started. In the long run, however, the only way to insure that you won't continue having difficulties is to learn some of the rudiments of Basic programming yourself. Learning how to program in Basic is challenging and fun, and will let you view programs in magazines and from other sources in a more educated light. The following books can help you on your way:

Your First Atari Basic Program by Rodnay Zaks; Sybex, Inc., 1983.

Atari Basic, XL Edition by Bob Albrecht, Leroy Finkel, and Jerald R. Brown; John Wiley & Sons, Inc., 1985.—JBJ

How To Lose Friends . . .

Dear Editor:

I think it was vile for an official Atari magazine to print the article "How to Win Friends and Influence User Groups" that appeared in your November/December issue.

I peeked into your article and poked around for what it meant and I reached the conclusion that it must be the first in a series on how to be a "big shot":

1. How to lie and cheat your computer friends to be a "big shot."

2. How to steal programs from other user groups or friends and put your name on it to be a "big shot."

3. How to break the code of a commercial computer software company so you can make copies and sell it to computer friends.

What about the "user friendly" concept, which to me means to help a novice or friend—not peek and poke him/her so they are frustrated trying to learn your program.

You should put an apology in the next issue. Without it I have to believe your magazine will try to be a "big shot magazine" even if you must lie and cheat your readers. I will end by asking you not to tell me I do not have a sense of humor.

Jules H. Lozowick
1802 Walker Ave.
Irvington, NJ 07111

OK, we won't tell you; we'll leave that to someone else. And we do apologize to you and anyone else who failed to enjoy David Busch's lighthearted look at an important part of Atari computing. We do, however, reserve the right to occasionally put tongue in cheek to make a point.

Zoomracks Revisited

Dear Editor:

I feel that the review of *Zoomracks II* that appeared in your November/December issue was unfair. I think your reviewer misunderstood some facts and concepts.

To begin with, the correct prices are as follows: *Zoomracks I* (revised), $79.95; *Zoomracks II*, $119.95.

More important, he says that "obvious key-to-function relationships have been 'rethought' here—instead of using the arrow keys to move up and down through racks and cards, *Zoomracks II* substitutes incomprehensibles such as F9 and Ctrl-X."

- Up and down arrows do move up and down visually on the screen and thus on cards and racks.
- F9 goes to the previous card (F10 goes to the next one). *Zoomracks II* has a simple conceptual model: fields in cards in racks. It has many visual modes to view that model—just as there are different kinds of shots in movies (long shots, closeups, point of view shots, etc.). F9 operates on the conceptual model, going to the previous card in all those modes independent of the visual display mode being used. Up arrow can't fulfill this function because, in moving visually on the screen, it goes to different cards in multicard mode (where you see the first line of different cards) and different lines of the same card in single card mode. (Ctrl-X, in going to the next line in a field, behaves similarly.) Once understood, these commands become quite intuitive, and our users find *Zoomracks II* very easy to use.

Unfortunately, your reviewer uses these facts as a base to say that *Zoomracks II* has a "kinky" user interface "only a bureaucrat could love," that "incites resentment." If your reviewer had spent time doing real work with

Zoomracks II, he would soon have gotten beyond his misunderstandings, been able to appreciate *Zoomracks II*, and been able to put the pain of his learning experience into perspective. Many of our users tell us they enjoy using the program and find it fun to use. This is rare in data base products.

I feel like a playwright would feel if a reviewer panned his Broadway play, complaining that traffic was horrible, the theatre was hot and crowded, the tickets were expensive, he had to leave in the middle to review another play, and he really didn't like Broadway shows anyway.

Zoomracks II is a new concept, and we think it has a lot of potential to open up new computer markets. We see people, frequently new computer users, using it for things people haven't used computers for in the past. If *Atari Explorer* could try to be open to new concepts and help introduce them to its readers, difficult though it is to recognize such concepts, the result might be to open up new markets for Atari and make the ST more successful.

Paul Heckel
Quickview Systems
146 Main St., Ste. 404
Los Altos, CA 94022

Mr. Heckel is quite right. You can use the arrow keys to move from place to place in Zoomracks II, though their function—like that of the mouse—appears to be non-orthogonal, as Mr. Heckel also notes. For example, in the main display, all four arrow keys move the cursor in the top half of the screen, while only the left and right arrows (used in combination with the Control key) are enabled at the bottom.

The reason I failed to make the connection is that the manual makes only a single, global reference to arrow keys (on page 4) and ignores them elsewhere. In their stead, it proposes using F9, F10, Ctrl-X, Ctrl-E, Tab, Back-tab(?) and the left and right bracket keys for local navigation.

That one factual inaccuracy aside, I fail to understand why Mr. Heckel takes such strong exception to what was not intended to be a negative evaluation. As in all our reviews, we pointed out the bad with the good. I presented my opinion—not only of the user interface, but of the documentation, the editor, the text capacity, the output formatting facilities, the macro facility, and many other features of the program—and concluded that "when all the metaphors are stripped back out of the way, Zoomracks is revealed as a fairly powerful, full-featured, text-oriented information management program that stands somewhere between the simple, one-function 'mailing list' utility and the more powerful, high-end database management system." What's so "unfair" about that?—JBJ

Time's Up

Shanner International Corp., manufacturer of the LogiKhron LCM-2000 clock/calendar reviewed on page 38 of our November/December issue, is no longer in business.

The good news is that Navarone Industries, maker of the Timekeeper clock/card reviewed in the same article, is not only alive and well, but has purchased the rights to the Hippo ST Sound Digitizer reviewed on page 85 of the November/December issue.

For information on either product, call or write Navarone Industries, 21109 Longeway Rd., Ste. C, Sonora, CA 95370; (800) 624-6545; (800)654-2821 in CA.

ATARI EXPLORER
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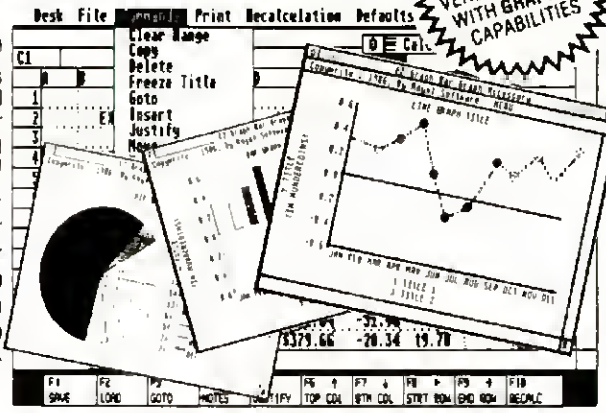

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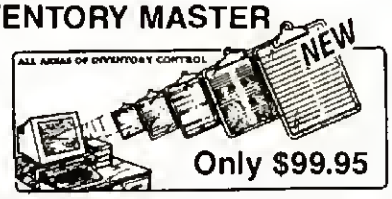

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Who Are You?

The results of the Survey: We reveal the likes, dislikes, desires, and demographics of our readers

In the September/October issue of *Atari Explorer*, we included a questionnaire asking about your interests, your computers, and your desires. Well over 700 people returned their questionnaires—an excellent response. We cut off tabulating responses on Christmas Eve; the analysis below is based on 709 respondents tabulated as of that date. What we learned was quite interesting to us, and we think you will find it so also.

Columns, features, articles, and review subjects were ranked by readers as great, good, fair, poor, or no opinion. Points were assigned to each of these categories from 0 to 5 to determine an overall rating for each item. On this totally arbitrary scale, the average score was 85; items which received scores above 85 were above average in reader preference, while those below 85 were less favored by readers. (See Chart 1.)

The highest rated features were new software and hardware announcements, product previews, and "Inside Atari," all with scores above 108. Letters to the Editor ranked sixth with a score of 102 followed by the Editorial with a score of 96.

Readers were most interested in reviews of personal productivity software (96), disk drives (95), and printers (90); less interested in reviews of entertainment software (80), communications software (80), business software (77), books (76), and educational software (76); and decidedly disinterested in reviews of plotters (54) and music systems (52).

Programming tutorials ranked high with readers (91), as did the User Friendly column (88) and articles on technology (88) and graphics (83). On the other hand, readers were rather cool toward ideas and philosophy (72), the Teletalk column (71), music (54), and people profiles (50).

Computers Used For Many Purposes

Over 72% of *Explorer* readers write programs from time to time; of those a whopping 97% use the Basic language. Basic is followed distantly by the percentage of readers using machine language (26%), Logo (16%), Pascal and C (both 13%), Action (9%), and Forth (5%). (See Chart 2.)

Nearly 64% of *Explorer* readers have keyed in a program from a magazine at one time or other. Over 99% of those readers admitted to having had difficulty getting a program from a magazine to run, and many readers wrote in the margin that they were leery of using such programs because of the difficulty in getting them to run. On the other hand, readers tend to be willing to key in some mighty long programs, with 61% being willing to type in a program of more than 200 lines and 30%, a program more than 500 lines long.

Just over one-third of *Explorer* readers subscribe to one or more information services. CompuServe, with usage by 28% of *Explorer* readers, leads the pack by a wide margin. It is followed by Delphi (9%), Genie (7%), "Other" (5%), Dow Jones (3%), and four others each with 1% or less. Interestingly, about 53% of all *Explorer* readers own a modem, so roughly 21% are not using their modems regularly. (See Chart 3.)

In software usage, word processing is number one with readers with 72% using it regularly and 19% occasionally. This is followed by entertainment software with 45% regular usage and 32% occasional usage, communications software (32% and 21%), database management software (29% and 30%), graphics software (26% and 35%), and spreadsheets (20% and 28%). Lower in usage are educational packages, financial analysis software, and music synthesis programs. (See Chart 4.)

On average, readers have invested $1094 in software, a rather substantial amount. Also indicative that readers expect to get a great deal of use from their computers is the fact that the average reader has invested in more than six different types of software (word processing, entertainment, graphics, etc.).

As the usage of different types of software is quite diverse, so are the places that readers use computers, as well as the types of computers used. Nearly 53% of *Explorer* readers use computers both at home and at their place of business; 14% use computers at home and at school; 30% use computers at home only; 2% at business only; and 1% of *Explorer* readers don't have a computer yet. (See Chart 5.)

In addition to using personal computers, 22% of our readers regularly use a mainframe, and 17% use a minicomputer. Among personal computers, as one might expect, Atari is the most dominant brand by far (99% ownership). It is followed by IBM or a PC compatible (25% ownership), Apple II or Macintosh (10%), and Commodore or other home computer (11%).

It is gratifying to note that 68% of *Explorer* readers own two or more Atari computers; 31% own three or more; and 13% own four or more. (See Chart 6.) Table 1 shows which computers are owned and which are used as readers' primary machines.

Computer	Primary Computer	Percent Owning
Atari 400 or 800	19%	36%
Atari 600, 800, 1200 XL	20	40
Atari 130 XE	17	31
Atari 520 ST	20	27
Atari 1040 ST	8	12
Any Atari computer	84	99
IBM PC or compatible	11	25
Apple II or Macintosh	3	10
Commodore, misc. home	1	11

Table 1. Computer ownership.

Readers' systems are remarkable well equipped. With the exception of a few older Atari 400 and 800 systems, nearly all have floppy disk drives, 80% have dot matrix printers, 15% have daisywheel printers, 53% have modems, 72% have color monitors, and 39% have graphics tablets or the equivalent. Not surprisingly, there are few hard disks on 8-bit series machines (1.5%), but 7% of 520STs are equipped with hard disks, and 12% of 1040STs are so equipped.

On average, readers have invested $1219 in their 8-bit systems, $1280 in their 520ST machines, and $1557 in their 1040ST computers. Add to this the investment in software, and it is apparent that *Explorer* readers have made a major committment to personal computing.

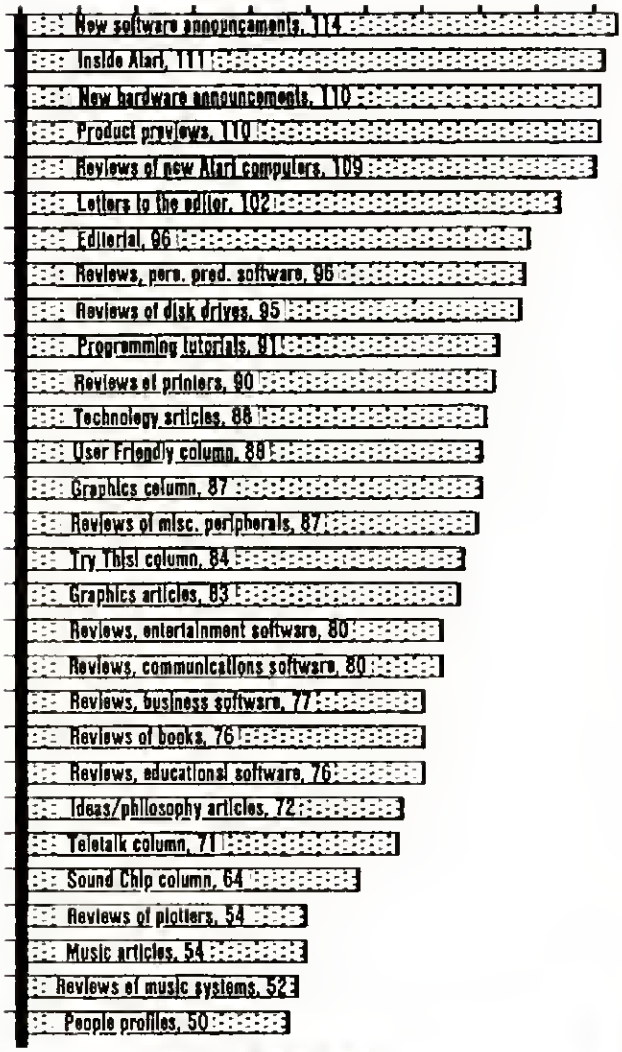

Chart 1. Editorial interests.

By DAVID H. AHL

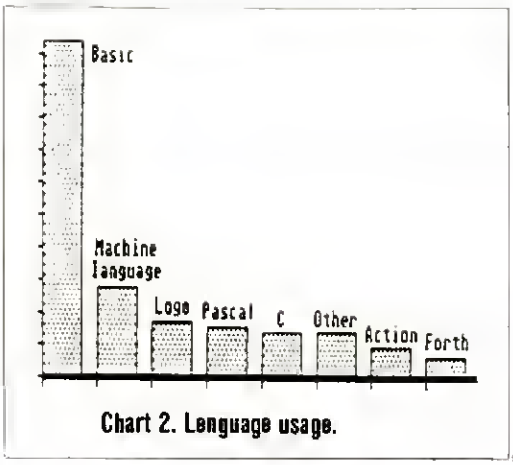

Chart 2. Language usage.

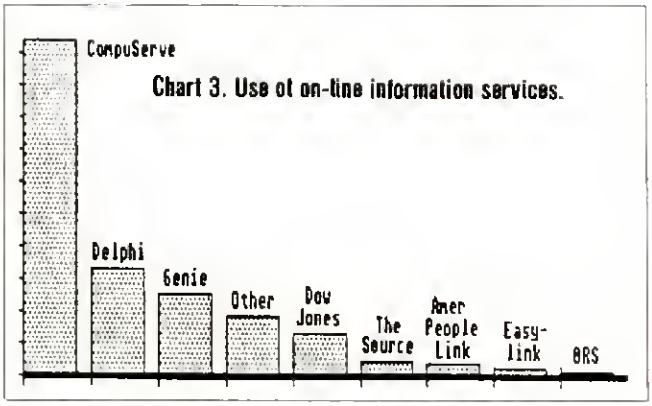

Chart 3. Use of on-line information services.

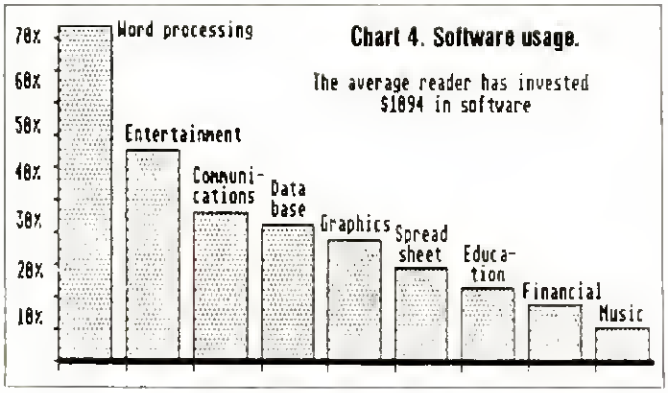

Chart 4. Software usage.

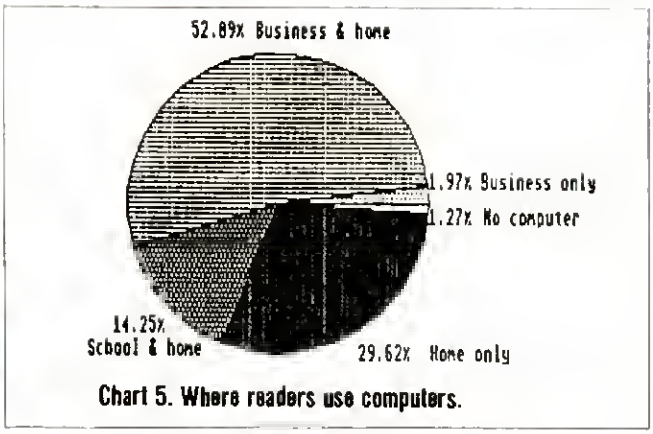

Chart 5. Where readers use computers.

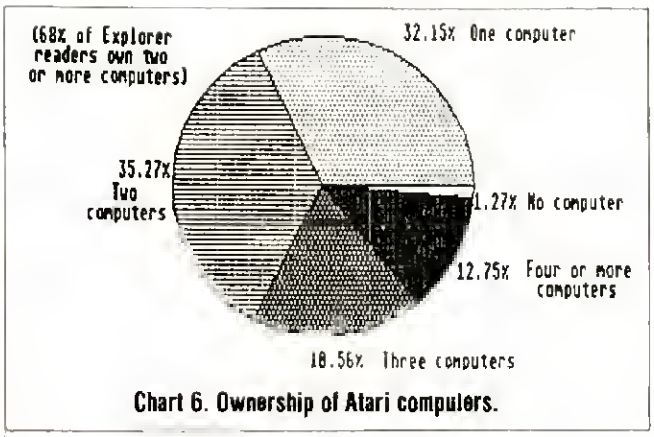

Chart 6. Ownership of Atari computers.

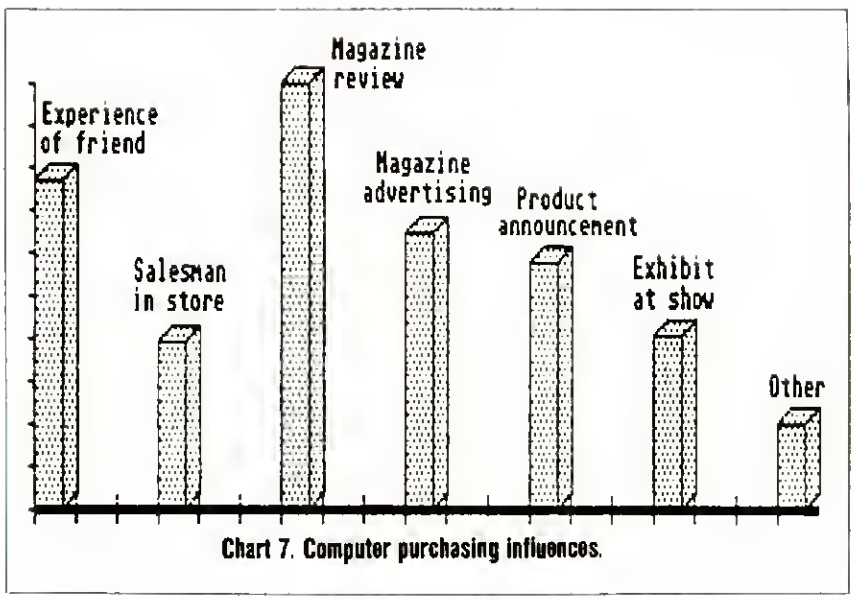

Chart 7. Computer purchasing influences.

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Purchasing Plans

Nearly 68% of *Explorer* readers plan to upgrade their current Atari computers, and many others wrote in marginal notes that while they do not plan to upgrade existing systems, they do plan to buy new Atari systems—most often an ST. Of those planning to upgrade, 29% expect to do so within the next three months, 21% in three to six months, and the remaining 50% within the next 12 months.

Ninety-three percent of *Explorer* readers indicated that they had purchased products by mail order, and 89% indicated that they had purchased one or more products as a result of having read a magazine advertisement.

We asked readers to rate different sources of information in order of importance for deciding upon purchases of computer hardware and software. From these ratings, we computed a weighted average for each item with values ranging from 1 (not important) to 7 (very important). Readers ranked magazine reviews as their most important source of information (rating 5.2). Reviews were followed by the experience of a friend (4.0), magazine advertising (3.3), and new product announcements (3.0). Readers had rather negative feelings about show exhibits—"phony and contrived," said one reader—(rating 2.1) and salesmen in stores (2.0). (See Chart 7.)

The average age of *Explorer* reader is 40; 94% are male; and their average income is $36,728 (including students, retired people, and part-time workers). The average income of primary wage earners alone would, of course, be much higher.

So now we know who you are: an enthusiastic computer user and sometime programmer committed to Atari equipment and satisfied enough to upgrade as new hardware and software become available. And we know what you want to see in this magazine and will try to deliver as much of that as we can in the coming months.

Thanks again for your help in building this profile. ■

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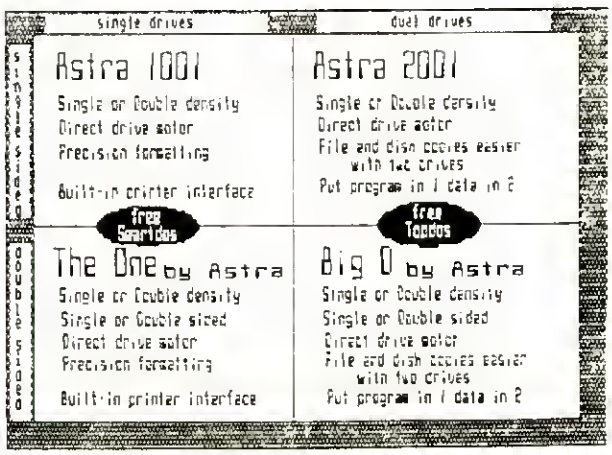

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Atari Announces Products At CES

New Mega ST Workstations, Low-Cost Atari Laser Printer, and The Atari PC Shown

LAS VEGAS, NV, Jan. 8—In a dramatic press conference held this morning at the Consumer Electronics Show, spokesmen for Atari (US) Corp. introduced a panoply of new products for 1987. Highlights included three significant new additions to Atari's flagship ST line of high-performance personal computers, a revolutionary low-cost laser printer, and an IBM PC-compatible personal computer of radically new design.

The new ST computers, dubbed Mega STs 1, 2, and 4, incorporate one, two, and four megabytes of RAM, respectively. Encased in a newly-designed system unit with integral 800K microfloppy drive and detachable, ergonomic keyboard, the new machines are visibly different from Atari's current 520ST and 1040ST models, while remaining 100% compatible with them.

Additional enhancements to the Mega machines include a battery-backed realtime clock, internal mounting space for an additional circuit board, and full external routing of the 68000 bus, making their architecture "wide open" for further enhancements. "We took all our customer's suggestions on how we could improve the ST and incorporated them in this series," said Neil Harris, Atari's director of marketing communications.

Delivery of the new machines, via computer specialty stores, is expected to begin shortly at a price-point of "about $1000."

The new Atari laser printer, shown in a prototype version, will match or exceed the performance of present laser printer systems while costing only about half as much—about $1500. Atari has accomplished this enormous cost saving by exploiting the power inherent in their ST computers. Coupled with an ST computer, the laser printer will form the output stage of a desktop publishing system costing less than $3000 total.

Atari's new IBM PC-compatible machine, the Atari PC, is a radical departure from present PC clone designs, offering top-of-the-line compatibility and featuring a record-breaking price of under $599. Housed in a system unit similar to the Mega ST with integral 5.25" floppy drive and detachable XT-style keyboard, the PC/XT compatible Atari PC sports 512K RAM standard (expandable to 640K on the motherboard), an additional 256K of graphics-dedicated RAM, a custom graphics chip providing enhanced EGA, CGA, IBM monochrome, and Hercules graphics capabilities, and a Microsoft compatible mouse.

It operates at the IBM standard 4.77 Mhz or in a high-speed 8 Mhz "turbo mode," and provides for the addition of an 8087 math coprocessor at either speed. A monochrome monitor designed for use with the Atari PC was also announced. Costing under $200, the monitor supports all Atari PC graphics modes, including the high-resolution, multicolor EGA mode in grey-scale. Shipments of the Atari PC will begin in March.

The new products—perceived by some as the fulfillment of promises made over a year ago by Atari CEO Jack Tramiel—are universally hailed as milestones for Atari Corp. One informed onlooker commented: "It's as if Atari, in one fell swoop, had stepped to the leading edge in three markets: high-performance workstations, desktop publishing systems, and the lucrative PC-compatible game. They're going to be the company to watch in 1987."

With somewhat less fanfare, Atari also announced a new slimline 20Mb Winchester drive for its ST line, incorporating an extra port for daisy-chaining with other DMA-compatible peripherals like the new laser printer.

At the same time, Atari announced price reductions on existing ST models. A 520ST monochrome system will now be available for $499 retail, a 1040ST with monochrome monitor for around $899, and a 1040ST with color monitor for around $1099.

Editor's note: This is a special report on new product announcements made by Atari at the Winter Consumer Electronics Show in Las Vegas. We were unable to obtain photographs of the new equipment in time to make our press deadlines; opting instead to bring our readers substantial news of the announcements in as timely a manner as possible.

Flagships Of The Atari Line: New Mega ST Workstations

Offer "Power Without The Price" For Desktop Publishing. Professional Applications

LAS VEGAS, NV, Jan. 8 —Atari's new Mega ST 1, 2, and 4 computers, announced today at the Consumer Electronics Show, set new personal computer price/performance standards—standards that the rest of the computer industry will be hard-pressed to meet or beat in 1987. Available starting at $1000, the new machines will offer up to 4Mb of RAM memory—16 times that found in most standard, high-end workstations.

The Mega ST is housed in an independent "system unit," about 22" square by 2" high, containing the CPU, a double-sided floppy disk drive, and an internal power supply. The normal complement of ST ports—DMA, RS-232 serial, parallel, disk, video, cartridge, MIDI, mouse, and joystick—plus an additional port for connecting the detachable, ergonomic keyboard, are included.

The Mega ST system unit is reinforced to support a monitor and can be stacked with other components—notably the enhanced 20Mb hard disk drive. Even fully loaded, it will occupy far less desk space than present ST configurations.

The sleek new Mega chassis contains a redesigned ST motherboard, sporting significant enhancements. A battery-backed clock calendar is now standard equipment, eliminating the present need to set time manually on power-up. The clock runs off alkaline penlight batteries—more easily obtainable and less expensive than "coin-type" lithium cells.

The Mega ST architecture is "wide open," permitting internal and external expansion with add-on circuit cards. The new design provides full access to the 68000 bus and power supply, and fixtures have been provided for installing a circuit board inside the case. Further expansion is possible by routing the bus outside to an external card-cage. RAM expansion up to 16Mb, and networking capabilities will soon be available from Atari as low-cost add-ons.

The detachable keyboard of the Mega ST is designed to the highest ergonomic standards for convenience and ease of use. Connected to the system unit by a coiled cable, the new keyboard can be held comfortably in the lap. When placed on the desktop, adjustable legs fold down to support the unit at the preferred typing angle. Internally, the keyboard has been enhanced with high-quality key switches for improved tactile and auditory feedback, better "feel," and increased reliability.

Where does the Mega line stand in relation to other Atari products? "They're our flagships," said Atari spokesman Neil Harris. "The Mega STs represent Atari's continued strong support of the ST architecture." They are also physical proof that Atari has been listening to its users and taking their advice seriously. "Most of the improvements we've made in the basic ST design have been taken from 'wish lists' that have come out of our dialogue with users over the past year," Harris said.

With vastly expanded memory, an open architecture, a more compact configuration with integrated peripherals, and an improved keyboard, the Mega machines are clearly intended for use as "professional" computers. Networking capabilities and sufficient memory for running multiple, co-resident applications, plus the promise of desktop publishing (in combination with the upcoming Atari laser printer) are sure to make the Mega ST an office favorite in the coming year.

Low-Cost Laser Printer Promises "Revolution" In Desktop Publishing

LAS VEGAS, NV, Jan. 8—A prototype laser printer, being demonstrated by Atari here at CES, will form the basis for a full-featured desktop publishing system costing less than half the price of systems built around competing architectures. Designed to interface with Atari's ST line of high-performance personal computers, the new laser printer will be taken to market later this year at the astoundingly low price of around $1500.

Desktop publishing—the use of personal computers to produce high-quality printed matter—has become a burgeoning industry over the past two years. Powerful, graphics-oriented personal computers like the Atari ST are now routinely used in typesetting, page design, paste-up, and—in combination with high-resolution laser printers—production of high-quality, "camera ready" output. However, largely because the price of laser printers has remained high, the cost of a desktop publishing system is still out of reach for many.

By redesigning the standard laser printer to take advantage of the power latent in the ST line—particularly the new Mega STs—Atari hopes to make full-featured desktop publishing a reality at less than $3000 for a complete system—about what a conventional laser printer alone costs today. Designed to interface with the ST's high-speed DMA (Direct Memory Access) port and incorporating a standard laser "engine," the Atari laser printer will produce rapid throughput at 300 dots-per-inch resolution.

Although technical details have not yet been released, Shiraz Shivji, head of Atari's hardware engineering division, stated that Atari "has designed an admirably flexible system that includes all the advantages and few of the disadvantages of present laser printer architectures.

"The printer will be able to handle multiple fonts and standard page-description languages at the discretion of software. Moreover, adapting present software to take full advantage of the capabilities of the laser printer should be fairly simple, providing such software has been written in conformance with GEM standards."

Atari Announces New Products At CES

The Atari PC:
More Than Just A Pretty Clone

LAS VEGAS, NV, Jan.8—The audience at this morning's CES press conference was stunned to learn that Atari Corporation, long a manufacturer of proprietary, high-performance home and personal computers, is planning to market an IBM PC-compatible machine. Industry insiders, however, were quick to note that Atari has always been known for bringing state-of-the-art products to market at low prices and for driving the industry by finding and staking out new turf.

In this context, it is less surprising that Atari has chosen to bring their special brand of competition to the place where, for the moment, the competition is hottest. "We saw no reason to ignore the fact that there are profits to be made in the IBM PC-compatible marketplace at this time," said Neil Harris, Atari's director of marketing communications, "especially since it is a different market than the one we are addressing with our high-end, flagship ST systems."

Currently, the PC-compatible industry is moving in two directions. At the low end, a group of more-or-less anonymous clone makers are packaging "bare bones" systems for the mail-order market. Buyers of such machines often find that they must add several hundred dollars worth of extra hardware before their "bargain systems" can accomplish useful work.

At the high end, clone makers like Hewlett-Packard, Tandy, and Compaq are providing more complete systems than IBM itself. At prices starting at around $1200, however, these machines can only be considered bargains when compared with the even higher cost of going with Big Blue.

In designing their PC, Atari management decided to run counter to both dominant trends. Instead, they reasoned that by applying new technology and old-fashioned manufacturing leverage, they could bring to market a fully-loaded, state-of-the-art system—a "here's everything you'll ever need" PC—at a price-point low enough to undercut even the "el cheapo" clone makers.

They appear to have succeeded. The Atari PC, which will retail for "around $600," is a compact and elegant system loaded with features not found on systems costing literally thousands of dollars more. Measuring about 22″ square by only 2″ high, the Atari PC system unit includes a built-in, half-height 5.25″ disk drive and integral power supply. An XT-style keyboard attaches to the unit via a coiled cable.

A second 5.25″ drive or ST-style 3.5″ drive, capable of reading disks in either ST or IBM format, can be attached externally. But that's just the beginning.

The Atari PC comes with 512K of RAM, expandable to 640K via sockets on the motherboard. Standard serial, parallel, and combination video ports, and an ST-style disk port, are all included. A mouse port, based on the Microsoft INPORT chip, is built in, and an ST-type mouse is included with the system. Thus, unlike competing PC-compatible systems, the Atari PC will be able to run PC GEM, Microsoft Windows, and mouse-based programs like *Microsoft Word*, right out of the box.

The Atari PC employs an 8088 microprocessor, which can run at 4.77 Mhz and in an enhanced 8 Mhz "turbo mode." An 8087 math coprocessor, running at either speed, can be added via a socket on the motherboard.

As one would expect, Atari has paid special attention the graphics capabilities of the Atari PC. Most low-cost PC compatibles support only the IBM monochrome mode, and are thus text-only systems. A few of the more expensive clones include IBM Color Graphics Adapter (CGA) and/or Hercules monochrome graphics capabilities.

IBM Enhanced Graphics Adapter (EGA) 640 × 350 × 16-color graphics capabilities have, in the past, been accessible only via expensive upgrades to the system display circuitry and the purchase of costly high-resolution monitors. Moreover, purchasers of the supposedly downward-compatible EGA enhancements have often been disappointed to discover that IBM-style EGA isn't as downward compatible as they had hoped—some CGA software won't run.

Yet, Atari has managed to shoehorn IBM monochrome, CGA, EGA, and Hercules graphics capabilities into the Atari PC. In addition to being the only PC-compatible to include EGA graphics as a standard feature, "our EGA is completely downward-compatible with CGA," noted Atari's Shiraz Shivji. "As a result, users will experience no compatibility problems when using the lower graphics modes."

What's more, Atari has announced a $200 monochrome greenscreen monitor for use with the Atari PC that can display all its graphics modes, including the high-resolution EGA color mode, using intensity gradients (grey scales) to represent colors. It is the first monitor to incorporate these capabilities. "The monitor is intelligent," said Shivji, "and recognizes the frequency of signals coming from the combination video port, adjusting itself appropriately to display whatever kind of text or graphics the machine produces."

The Atari PC is virtually 100% compatible with software available for the IBM PC and XT.

While its slimline housing provides no room for mounting internal circuit cards, it is doubtful that more than a handful of users will require more capabilities than the machine provides in its off-the-shelf configuration. For those who do, Atari intends to provide an external expansion box in the near future.

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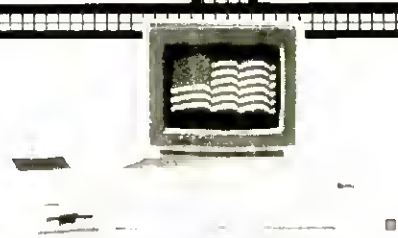

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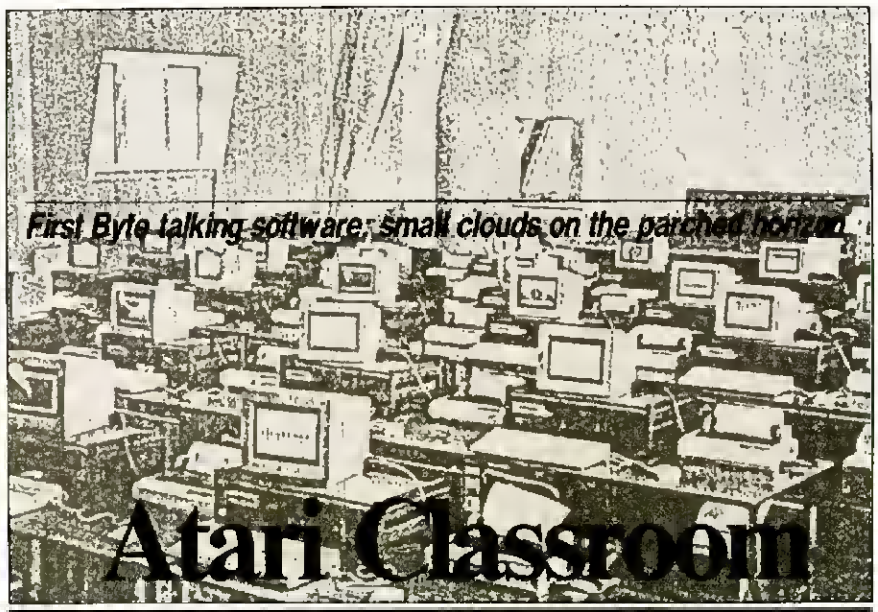


First Byte talking software: small clouds on the parched horizon

Atari Classroom

By BETSY STAPLES

Last issue I deplored the dearth of educational software for the ST and promised a look at some new releases from First Byte. I had hoped to announce the first showers on a parched landscape, the beginning of the end of the educational software drought. Unfortunately, the programs you will read about here are closer akin to clouds on the horizon; they portend relief but do not themselves contribute substantially to the solution of the problem.

We reviewed *Speller Bee* and *Mathtalk*, two packages in First Byte's Talking Notebook Series, both of which feature built-in synthesized speech.

A sticker on the package says that the programs are "for the Atari ST 520 or 1040. No additional hardware or software needed." This statement is true as regards the speech synthesis capabilities of the programs, but fails to reveal the need for a color monitor, which we assume would be considered "additional hardware" by owners of monochrome systems. The only mention of the need for a color monitor is found on a loose sheet of paper inside the box.

Mathtalk

Having set up *Mathtalk* on a color system, we brought in our playtesters, gave them a quick lesson in mousing, and sat back to watch them learn.

The main menu offers a choice of Math Book, Whiz, Game Room, and Scores. Math Book adds enormous flexibility to the program by allowing you to type in pages of practice problems in addition, subtraction, multiplication, or division. A page holds up to 24 problems, and all problems on a given page must be of the same type. Pages can be printed out and used as worksheets.

The Whiz menu offers two choices, Solve It and Scoreboard. Solve It presents programs and provides immediate feedback on your answers. Scoreboard takes the form of a test and tells you your score after you have solved all the problems. You have an opportunity to review the problems you missed.

Game Room gives a choice of Table Talk and Mystery Number. Table Talk presents a grid with the numbers 0 to 9 across the top of the screen and down the left-hand side. You indicate how much time you want to spend solving the problems and then race the clock to see how many you can get right in the time allotted. As you solve a problem—9+4, for example—the intersection of those two numbers is filled in on the grid.

Table Talk was definitely the most favored activity on the disk. Our playtesters enjoyed filling in the table and switched back and forth between mouse and keyboard entry without difficulty. We had trouble tearing them away to try Mystery Number.

Mystery Number presents problems with numbers missing. It is your job to fill in the blanks, again working against time. The graphics on this screen are the most elaborate in the whole program, featuring a thermometer that keeps track of your percentage of correct answers as you go along. The children found filling in the blanks a bit more difficult, but seemed to enjoy the change of pace.

The Scores menu allows you to set up a score file in which to save scores from Scoreboard, Table Talk, and Mystery Number.

Each time you boot the program, you can choose whether or not to engage the sound. If you choose to have sound, a synthesized voice recites the instructions and reinforces correct answers with congratulatory messages. This sounds great—almost like a real teacher—but in reality turns out to be simply a gimmick, because unless your kids have been raised by a robot nanny, they probably won't be able to understand the voice; ours couldn't.

The documentation for *Mathtalk* is the strongest part of the package. It provides clear instructions, educational objectives, and four pages of additional activities—all of which we applaud. Unfortunately, it also uses incorrect grammar: "With Mathtalk *your child* will be able to enter *their* math problems . . . "

Our overall impression of the *Mathtalk*? Well, it has potential; the kids really did enjoy the format of the drill offered by Table Talk and Mystery Number. But it loses points in pedagogy on our report card, because of inconsistency in the way users are asked to enter their answers to the various problems. Some activities require the answers to be entered from right to left, as you would if you were using pencil and paper, while others expect the reverse, left to right.

All things considered, *Mathtalk* is an adequate drill and practice program; it won't *teach* your kids anything, but it will probably provide an incentive for them to practice their arithmetic—which may be all you want or need.

System: Atari ST
Price: $49.95
Age Range: Primary - Elementary grades
Summary: Talking math program provides drill and practice.
Manufacturer:
First Byte, Inc.
2845 Temple Ave.
Long Beach, CA 90806
(213) 595-7006

Speller Bee

We have long maintained that it is impossible to teach or even practice spelling with a computer, because you either have to show the child the word spelled correctly, in which case he has only to copy it, or show it to him spelled incorrectly, which may destroy any hope he has of ever becoming a good speller—unless, of course, you use a

Mathtalk

Speller Bee

speech synthesizer . . .

Speller Bee welcomes you with a picture menu from which to choose your activities; the My Words menu, for example, is a picture of a little boy who appears to be wearing a strait jacket and a muzzle—better they should have put the muzzle on the talking bee who guides you through the program.

My Words lets you enter up to 32 lists of 10 words each—again, an excellent feature. You can also use any of the 15 lists included with the program—words ranging in difficulty from "in" to "encyclopedia."

System: Atari ST
Price: $49.95
Age Range: Preschool - Jr. High
Summary: Talking spelling program with excellent documentation
Manufacturer:
First Byte, Inc.
2845 Temple Ave.
Long Beach, CA 90806
(213) 595-7006

The Spell Power menu offers three choices. In Bee Prepared you study one word at a time from your list. The word appears, is pronounced by the bee, and then spelled out by the bee.

Spelling Bee tests you on the words in your list; the bee pronounces a word, and you type it in. This is where the trouble starts: our playtesters could not understand the synthesized speech, so they often hadn't a prayer of typing the correct word unless an adult translated it for them—and even the adults sometimes had difficulty. The game became a test not of spelling but of trying to remember the words on the list and guessing which was being pronounced. Our playtesters found this very frustrating.

Bee Games, the third choice on the menu, offers three games: Search, Scramble, and Detective. Search is simply a word search puzzle using the words in a list you select, and Scramble asks you to unscramble a nonsense word to make one of your spelling words. While the kids enjoyed these activities, they are, in our opinion, of little educational value.

In Detective, you are presented with a sequence of letters and question marks. Your job is to fill in the missing letters to make one of your spelling words. The pedagogical problem here arises when the blanks in the object word can be filled to make two or more words in the list. One list, for example, includes the words "ride," "dime," and "nine," any of which could be the correct answer for "?i?e." *Speller Bee*, however, accepts only the word it has chosen for that particular question: both of the other answers are considered incorrect—again, very confusing and frustrating for the child.

The documentation for *Speller Bee* is excellent, providing instructions, illustrations, objectives, and detailed hints for parents and helpers. It is really a pity the program itself doesn't measure up. ■

Notes on the Pittsburgh Atari Show and how to be included in The First Atari Explorer User Group Directory

User Friendly

By BETSY STAPLES

The thing that evokes for me the most vivid memories of the early days of personal computing is computer-generated music. It takes me back to John Dilks's Personal Computing Colleges in Atlantic City and Philadelphia and to West Coast Computer Faires with low single-digit numbers. It reminds me of incessantly tinkling Pets and warbling Apple IIs and rekindles the excitement of those shows at which exhibitors and visitors alike were infused with the zeal of new converts.

The music being generated in the **Hybrid Arts** (11920 W. Olympic Blvd., Los Angeles, CA 90064 (213) 826-3777) booth at the Atari Fair in Pittsburgh was a far cry from the single-voice ditties of bygone days, but it was no less incessant or exciting.

The complex and professional-sounding music was showing off the capabilities and features of recording software for both 8-bit and ST computers, software with which sequences entered either from the computer keyboard or from a master MIDI keyboard like the Casio CZ-101 can be recorded and played back in combination with other sequences similarly recorded to produce professional-quality arrangements. Keep your eye on "Sound Chip" to learn more about Hybrid Arts and MIDI.

There was no music in the **Atari** booth, but Atari's newest software, including *AtariWriter Plus*, *Planetarium*, and *Star Raiders II* was available for testing and in-depth evaluation by showgoers of all ages. The long-awaited 80-column card, the XEP80, was on display in prototypical flesh — or plastic, if you prefer — and slated for First Quarter '87 delivery.

Also on display and promised for early 1987 was the Blitter chip doing its impressive flying bird demo. Mark Jansen of Atari Customer Service, charged with the safety of the chip, kept a watchful eye on the 1040 that housed it during the show and carried it with him everywhere he went after hours—imagine managing your Sunday brunch buffet plate with a 1040 under one arm! Mark did it with aplomb.

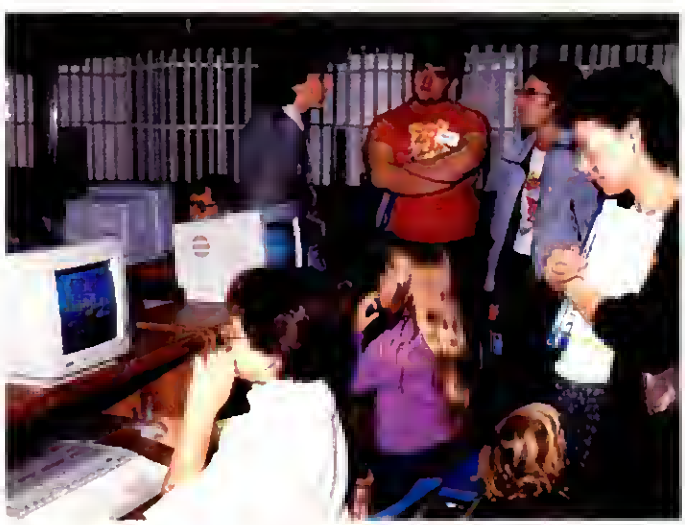
Desk Accessory Cartridge

Just inside the door to the exhibit area, John DeMar of **Quantum Microsystems Inc.** (P.O. Box 179, Liverpool, NY 13088 (315) 451-7747) was demonstrating DeskCart, a desk accessory cartridge that adds 14 functions to the ST, including a calendar, notebook, address book, print spooler, terminal emulator, and macros. The ROM cartridge, which also includes a battery-backed clock, sells for $99.95.

QMI also markets telecommunications software for the ST. *ST-Talk Professional 2.0* offers an 80 × 24 display with custom fonts within a GEM window; support for VT-100, VT-52, full ATASCII, and Vidtex graphics; file transfer using xmodem, xmodem crc, or batch ymodem; a smart macro language for auto-logon, auto-answer, and keyboard macros; and a message and capture editor which doubles as a mini word processor. The program is priced at $29.95

BB/ST is a bulletin board system that features on-line Vidtex graphics in menus and messages, menu and prompt editors for easy customizing, extensive remote sysop functions, and automatic baud rate detection. It carries a retail price of $49.95

Across the aisle from QMI, representatives from **Michtron** (576 S. Telegraph, Pontiac, MI 48053 (313) 334-5700) were doing a booming business in



Atarians of all ages had an opportunity to put new ST and Home Computer software through its paces. In the background, Mark Jansen (left) answers technical questions.

Putting On An Atari Fair

We spoke with John Babson and Lanny Shoup, president and vice president of the Pittsburgh Atari Computer Enthusiasts, on Sunday afternoon, November 23, as the show on which their user group had worked for the past nine months drew to a close. We asked them how it was done; what other user groups should know as they considered sponsoring Atari Fairs.

By way of background, they explained that P.A.C.E. has about 200 members, most of whom attend one or both of the two meetings the group holds each month: about 150 people regularly attend the meetings that concentrate on 8-bit systems, and about 50 go to the meetings that deal with the concerns of ST users.

The club maintains a bulletin board from which members can download public domain software and on which they can leave messages for one another. Public domain software is also available to members through a P.A.C.E.-sponsored software library, and members exchange news and other information through a monthly newsletter.

Atari's Cary Gee (right) discusses the Blitter with showgoers.

John, one of the founding fathers of the five-year old organization, thinks that the key to having a successful user group is to make sure that members continue to have fun: "They'll stay active and work hard as long as they're having fun."

And what makes Atari users join a user group in the first place? John thinks it's because "We like the people; we like the computer; and we like what we can do together."

Lanny even chose the Atari because of the support he saw in the user group. "I was looking for a computer with support," he says, "and when I saw what P.A.C.E. could provide, I decided to buy an Atari."

The Best and The Worst

For John, the most difficult and the most rewarding aspects of the show were closely related. The most difficult part for him was waiting for things to come together: two weeks before the show, only ten exhibitors had paid for their space, no advertising had been done, and he wondered if the show would ever happen. But that uncertainty served only to heighten the satisfaction he felt when everything did come together.

Preparing for the show took a great deal of John and Lanny's time along with the time of about a dozen other members of P.A.C.E. and the three other clubs that shared some of the burdens: the Westmoreland Atari Computer Organization, the Spectrum Atari Group of Erie, and O.P.A.C.E. of Youngstown, OH. Everyone who worked on it seemed to agree, however, that their investment of time and effort had paid off.

According to John, it paid off in increased exposure for the club and in better relationships with local vendors, who now understand better what the club does. Even if P.A.C.E. hadn't made any money (they did), John thinks that the whole experience would have been worthwhile.

Advice for Other Groups

When asked what advice they could offer to other user groups regarding the Atari Fair program, both John and Lanny responded with a resounding: "Do it!"

John said that P.A.C.E. had decided in advance to "do it Atari's way," and they were satisfied with all of User Group Coordinator Sandi Austin's recommendations.

They tried to downplay the presence of the user groups themselves, feeling that a show should be a place where the exhibitors take center stage, and would advise other sponsors to do the same.

And the most telling question of all: Would they do it again? An emphatic "yes!" ■

sales of their popular products for the ST.

Then we found Matthew Zobian of **Zobian Controls** (P.O. Box 6406 Wyomissing, PA 19610 (215) 374-5478) showing his RAOS (Rat Actuated Operating System), a GEM-like windowing environment for 8-bit Atari computers. Using the SuperRat digital mouse and Zobian's Z-DOS desktop program, Atari Home Computer users can access disk files as easily as ST users can. Several well known software developers, Zobian told us, are working on RAOS-compatible programs. The RAOS/SuperRat system sells for $99.90.

The Hybrid Arts booth was always crowded.

Nearby, **Microcube Corporation** (P.O. Box 488, Leesburg, VA 22075 (703) 777-7157) displayed the MicroFlyte ATC, a joystick designed to provide accurate and proportional control over *Flight Simulator II*. This unusual peripheral provides control over the throttle, brakes, guns, flaps, elevators, ailerons, and rudder of your *Flight Simulator II* aircraft without using the keyboard. The MicroFlyte ATC has been available for Atari 8-bit systems ($59.95) for some time, and an ST version was announced at the show.

Progressive Computer Applications (2002 McAuliffe Dr., Rockville, MD 20851 (301) 340-8398) was showing the latest version of *The Graphic Artist* and attracting a lot of attention. See the November/December 1986 issue of *Atari Explorer* for a complete review of the product.

The Printed Word

Directly across from the Atari booth was **XLent Software** (P.O. Box 5228, Springfield, VA 22150 (703) 644-8881). There, Linda Kubota-Barnes enthusiastically demonstrated *The XLent*

Word Processor for Atari 8-bit computers, which sells for a very reasonable $29.95, and the new *Typesetter Elite* for the 520 and 1040ST. *Typesetter Elite* is a GEM-based update of XLent's *Typesetter ST*. It allows you to lay out a full printed page, incorporat-

ing graphics and custom type fonts, and sells for $49.95.

Right next to the *Atari Explorer* booth, George Morrison of **Alpha Systems** (4435 Maplepark Rd., Stow, OH 44224 (216) 374-7469) spent the weekend showing Atarians three new products, Power RAM and *Power Print ST* for the ST and *Your Atari Comes Alive* for 8-bit systems.

Power RAM is a plug-in RAMdisk that provides an extra 512K of memory without voiding Atari's warranty; optional features include a clock and battery backup. *Power Print ST* is a graphics print program that supports multiple sizes and shapes, 16 shades of gray, and color printing as well. It sells for $39.95.

Your Atari Comes Alive is a book and disk package that George describes as "an experimenter's handbook for 8-bit owners that provides all you need to hook your computer up to outside devices." It sells for $24.95.

A sign on the table in the Alpha booth promised that a color version of the popular *Computer Eyes* digitizing program for the ST would be available for $199.95 from Alpha in the near future.

In the **Shelbourne Software Systems** (7221 Rising Sun Ave., Ste. 191, Philadelphia, PA 19111) booth, two pub games were on display: *ST Pool* and a soon-to-be-released tabletop shuffleboard game. Watch for reviews in these pages.

Talking to both exhibitors and showgoers on Sunday afternoon, we knew that the show had been a success. Most of the exhibitors who had come to sell had sold at least as much as they had hoped to sell, and visitors who had come looking for new products and information on Atari systems had found more than enough of both to satisfy them. ■

Atari Fair Schedule

Denver, CO
Rocky Mountain Atari Expo
February 28-March 1, 1987
Holiday Inn, Northglenn
Expo BBS: (303) 452-9594

Allentown, PA
ABE'S ACES
March 14-15, 1987
Hilton Hotel, Allentown

Salt Lake City, UT
ACE of Salt Lake
April 10-11, 1987

Buffalo, NY
Western NY Atari User Group
April 25-26, 1987
Buffalo Convention Center

Dallas, TX
DAL-ACE
May 8-9, 1987
Infomart, Dallas

Seattle, WA
May 16-17, 1987
Seattle Center, FLAG Pavillion

Detroit, MI
MACE
August 29-30, 1987
Southfield Civic Center

For further information, contact Sandi Austin, Atari Corp., 1196 Borregas Ave., Sunnyvale, CA 94086. (408) 745-2012.

You Asked For It

Among the things you have suggested in your letters and on your Reader Survey forms is a directory of Atari user groups.

We plan to publish this directory in an upcoming issue, but once again, we need your help. Please designate *one* person in your user group to provide the following information about your group:

1. Full name and acronym.
2. Address.
3. Name of president.
4. Name of membership chairperson.
5. Frequency of meetings.
6. Location of meetings.
7. A phone number for prospective members to call for verification of meeting times/dates and other information.
8. Dues.
9. Does the group publish a newsletter? If so, give name and frequency.
10. Does the group maintain a BBS? If so, provide details.
11. Approximate number of members.
12. Anything else you think we should know.

Compile this information in legible (typed or printed) form and mail it to:
User Friendly
Atari Explorer
7 Hilltop Rd.
Mendham, NJ 07960
Submissions must be received by March 15, 1987 to be included in the directory.

Software copyright; Atari goes public; and hospitals get Ataris for kids

News & Views

By DAVID H. AHL

Two recent federal court decisions have significantly broadened software copyright protection, in general pleasing large software producers and angering small ones. Specifically, the courts have ruled that one program infringes on another if it duplicates the overall performance, appearance, or structure of that program.

In the first case, Jaslow Dental Laboratories wrote a program in Basic that performed similar functions to one written by Elaine Whalen to manage finances in dental laboratories. The Jaslow program was not a direct transliteration of the Whalen program, but the court concluded it was a copy because there was "substantial similarity in the program's structure, sequence, and organization."

The Whalen-Jaslow ruling was cited by federal district court in San Francisco when it ruled that Unison World's *Print Master* infringed Broderbund's copyright on its *Print Shop* by duplicating its "overall appearance, structure, and sequence." In particular, the court said that Unison copied the appearance and sequence of Broderbund's instruction screens.

Some software developers say the Broderbund ruling could cause havoc among programmers if widely applied. Many software designers try to make their menus look like those in other programs to make it simpler for users to move between programs. Programmers say the rulings make it hard to distinguish between ideas—which can't be copyrighted—and the expression of those ideas—which can be. Further suits seem inevitable, as courts refine their definition of how similar to another a program must be before it violates a copyright.

Atari Stock Offering

Since being purchased by Jack Tramiel from Warner Communications nearly two years ago, Atari has been rather short of operating capital. However, a public stock offering in November was immediately oversubscribed by enthusiastic investors and raised $51 million in cash for the company. The stock opened at $11.50 and was trading as high as $14+ in the first two weeks.

A part of the money raised will be used to finance an advertising campaign, although relatively little money is earmarked for this purpose. A new print advertising campaign is being mounted for the ST series in newsweeklies, science, and business publications around the theme, "Technology so advanced, it's affordable."

The XE series will be advertised on television in a hard-hitting campaign comparing it to the Commodore 64. The 30-second spot features two children working on the competing computers. As the announcer explains that each child is smart to buy a computer, the kid's foreheads suddenly inflate. When the announcer states how inexpensive the Atari XE computer is, the Commodore owner's forehead deflates, and the Atari owner's pate zooms even larger.

Atari is also staging a joint promotion with 19 software publishers involving coupons for free and discounted software. The coupon books are available from dealers carrying the ST line of computers, generally in conjunction with the purchase of a computer.

Ataris for Kids

Uncomfortable, often hurting and confused, hospitalized kids need a lot of very special caring. Separated from family and friends except for certain hours of the day, the hospitalized child may suffer from loneliness and isolation almost as much as illness. Though most hospitals provide well-equipped "playroom" facilities for occupying young patients and distracting them from their ills, the most pressing needs of child-patients—for contact and communication—are seldom satisfied.

Martha Schriver, public relations coordinator for Hi-Tech Expressions, thought computers might help. Coupled with Hi-Tech's greeting-card software, colorful computer paper, and supplies, computers might help sick kids "reach out" more freely and easily to family and friends, stimulating communication.

Martha conceived a modest plan to donate Hi-Tech software and supplies to several children's hospitals, but hit a snag when she discovered that most hospitals weren't equipped with appropriate computer facilities. Still seeking to develop the idea into a workable form, she approached Atari's Michael Katz for assistance.

Mike responded enthusiastically. "We thought that our computers and their software would work perfectly to provide entertainment, education, and 'uplift' to hospitalized kids, and we really wanted to help out." At his prompting, Atari agreed to donate some 30 8-bit computer systems, including disk drives and printers, to ten children's hospitals, nationwide.

Next came a logistical dilemma—what was the best way to get the equipment and software to the hospitals, get it set up, and instruct hospital staffers in its use? Martha found the Atari community eager to help in this, as well. User groups in ten major cities pitched in to receive the equipment, set up workstations, and help to familiarize staff and patients with the ins and outs of Atari hardware and Hi-Tech software.

Group members arranged seminars, donated additional software and supplies, and even repaired equipment damaged in transit. When Martha made formal visits to the hospitals during the month of November, user group members were on hand to assist her presentations and make sure things went smoothly on the technical end. Individually and collectively, the groups also agreed to act as an ongoing resource for hospitals participating in the program, helping them develop wider applications for Atari computers in the hospital setting.

As Martha—herself a mother of two—had suspected, the computers were an instant hit. Using Hi-Tech's software and supplies, kids could create attractive, customized greeting cards and letters faster and more easily than with paper and pen. Animated images and sound effects drew the attention of even the youngest patients.

"Very young children, especially if they're sick, don't concentrate on anything very long unless it's entertaining," she says. "The computers keep them involved and let them produce something that's special to share with their families."

What do the kids say? One little girl's shy request, after her first turn at the keyboard, sums it up: "I want to make another card." ■

The Atari Alternative

Atari hardware and software producers provide an oasis of excitement in the big blue desert

The air was literally crackling with electricity. Most of it, unfortunately, was caused simply by thick carpets and dry, cool desert air. After a brisk walk in my Reeboks from the elevator down the corridor of the Bally Grand, a six-inch arc leapt from my room key to my doorknob. By the end of the week, I was operant-conditioned to avoid doors of any kind. Shades of Skinner! Has anyone seen my food pellets?

Anyhow. This time around, the magic number on many lips was 386. No, it wasn't a new number on the roulette wheel. Haven't you heard? The miraculous Intel 80386. The future of IBM-compatible computing.

Yawn. Excuse me. But there's really no electricity to be found in that number.

There was at least one spot on the Comdex Show floor where the sparks of excitement were more palpable, and more sincere, than anywhere else. Even after closing time on the last day of the show, when tumbleweeds were drifting across the rest of the floor, it was hard to cross the Atari booth without doing your Walter Payton impression. It would sound too much like blatant propaganda to say "Atari was the real news of Comdex 1986," so I won't, even though it's true.

If for some perverse reason you happened to be looking for a booth manned by that fruity computer company, you were out of luck—they weren't there. At an occasional software display you might have run across one of their "new" reheated graphics and sound boxes. I must stifle another yawn. There must be a better way to get an autograph from the Woz.

Also conspicuous by its absence was any sign of the company that markets the computer named after a female Spanish friend. Given that they have long touted their entry as a business machine, their absence at the show might be puzzling, were it not well known that the company has faced some rather sticky financial woes lately.

And so Atari bravely posed the only viable alternative to the humdrum Intel onslaught at Comdex. And they received an impressive reception, even from the ranks of the quasi-brainwashed. Every country in the free world now has its own nationalist group of clonemakers—and they all stopped by, it seems. The Iron Curtain is now represented by Communist China, by the way. Its clone is called "The Great Wall." An apt name indeed, for the entire situation, I daresay.

As a result, a frequent query squeaked from desert-dried throats in the Atari booth: "Is it compatible?" Avid Atarians choked down the natural response "Good Lord, who cares?" in favor of "Real soon now." No reason to trouble small minds with large concepts. Yes, you can put training wheels on a Honda Goldwing, too.

And top off your tux with a beanie and propeller, if that's your thing.

Following are some of the wares that were on display at the show.

Personal/Professional Productivity

Timeworks (444 Lake Cook Rd., Deerfield, IL 60015, (312) 948-9200) was showing a collection of integrated productivity programs for home and office. *Word Writer ST* offers onscreen underlining, italics, boldface, light type, subscripts, and superscripts; an integrated outline processor; a cut and paste function; SwiftKeys to convert multikey commands to a single stroke; online prompting; a built-in print spooler; three spelling checkers, and the usual array of word processing functions. $79.95.

Data Manager ST includes full GEM interfacing, a search feature that allows you to cross-search categories to locate a specific group of items, a sort feature, graphics, math capability, and customized reports. $79.95

SwiftCalc ST includes graphics, the ability to print a spreadsheet sideways, 8192 rows and 256 columns, mathematical functions, financial analysis functions, and the usual database storage and retrieval capabilities. $79.95.

Mirrorsoft (74 Worship St., London, EC2A 2EN, England, 01-377-4645) launched *Fleet Street Editor* and *Fleet Street Publisher*, desktop publishing programs for the ST. *Editor* is intended for the novice user: text can be typed into the program directly or imported from a word processing program as an ASCII file. Graphics can be created with the program or cut from the supplied clip-art library.

Fleet Street Publisher is designed for the more experienced user, offering two levels of complexity. Both levels allow you to produce multiple-page documents with editable layouts, left- and right-hand page orientation, sequential and non-sequential columns, and more.

Also being shown was the long-awaited *VIP Professional* from ISD Marketing (2651 John St., Unit 3, Markham, ON, Canada L3R 2W5, (416) 479-1880).

A *Lotus 1-2-3* workalike, *VIP Professional* features "identical spreadsheet, database, and grahics," .WKS file compatibility, macro support, and "identical menu command structure." The program also boasts the GEM interface, support for printers supported by GEM, and the ability to view graphs and a spreadsheet simultaneously. It works on 520 and 1040 ST systems with either color or monochrome display and can be used with a hard disk drive. $249.95.

E-Z Calc was being demonstrated by Royal Software (2160 W. 11th Ave., Eugene, OR, (503) 683-5361). This GEM-based spreadsheet offers 300 columns by 999 rows, a built-in calculator, a built-in sort routine, ten macros controlled by function keys, a notepad, split-screen capability, and on-line help windows. $69.95.

Regent Software (7131 Owensmouth, 45A, Canoga Park, CA 91303, (818) 882-2800) was demonstrating *Regent Base*, *Regent Word II*, *Regent*

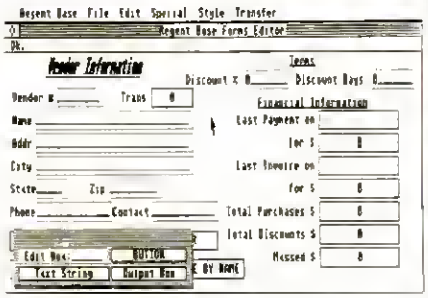
By JOHN J. ANDERSON

Accounting and *Regent Pak*.

Regent Base is a relational GEM database with procedural language for the ST. Designed for small business and home use, the program offers optional modules for invoicing, accounts receivable, checkbook balancing, general ledger, financial reporting, accounts payable, et al.

Features of *Regent Word II* include a 30,000-word spelling checker, built-in mail merge facility, and support of 15 printers with built-in printer drivers. *Regent Pak* combines *Regent Word I* and *Regent Spell* in one package.

Regent Accounting is double-entry accounting system for small businesses.



It includes accounts payable, accounts receivable, general ledger, customized financial reporting, and transaction audit trails.

Graphics

Digital Vision (14 Oak St., Ste. 2, Needham, MA 02192, (617) 444-9040) demonstrated the Computereyes Color Video Digitizing System for Atari ST computers. Computereyes is a slow-scan device that captures images in full color or black and white from any standard NTSC composite video source (VCR, video camera, video disc, etc.)

The interface module plugs into the cartridge port and supports all ST graphics modes in a variety of image formats. Brightness, contrast, and color balance are calibrated automatically, and images can be saved as files compatible with popular graphics packages, including *Neochrome* and *Degas*. $249.95.

Three companies were showing computer-aided design programs for the ST. **Generic Software** (8763 148th N.E., Bldg. C, Redmond, WA 98052, (800) 228-3601) had *FirstCADD Atari* on display. An entry level two-dimensional drafting and design package, *FirstCADD* is designed to help you create flow charts, organizational charts, graphs, presentations, forms, floor plans, elevations, product drawings, and flyers. $49.95.

Timeworks was showing ***a collection of integrated productivity programs for home and office.***

Foresight Resources (932 Massachusetts, Lawrence, KS 66044, (913) 841-1121) announced *Drafix 1* for the Atari ST. Features include automatic dimensioning, snap mode, layering, and transform/copy. Any item on the screen can possess attributes, including any of 16 pen colors, 8 line types, 256 layers, 12 text fonts, and 32 point marker types.

Drafix provides infinite zoom capabilities and allows up to eight views to be saved for instantaneous recall. $249.00.

The Draftsman from **World of Windows** (P.O. Box 968, Orem, UT 84057, (801) 226-3270) offers lines, circles, arcs, dimensioning, fills, layers, text, edit features, view controls, grids, and borders. $99.95.

Music

As usual, the **Hybrid Arts** (11920 W. Olympic Blvd., Los Angeles, CA 90064, (213) 826-3777) demonstration attracted a great deal of attention. Atarians and even owners of Brand X computers seem to be fascinated by the music-making potential of Atari machines.

Hybrid Arts was demonstrating *EZ-Track ST*, a 20-track polyphonic MIDI recorder for the ST. The program allows music to be recorded directly from a MIDI keyboard in real time or step time, with a range of .5 to 480 beats per minute. $65.

Electronic Music Publishing House (2210 Wilshire Blvd., Santa Monica, CA 90403, (213)455-2025) also offers a record/playback system for the ST. Called *Midiplay*, it supports all 16 channels of MIDI information, including velocity, both key and channel aftertouch, pitch bend, program changes, and all 128 MIDI controller. $49.95.

Metatrak from **Midisoft** (P.O. Box 1000, Bellevue, WA 98009, (206) 827-0750) is billed as a "multi-track MIDI recording studio for the Atari ST." The program features real-time record/playback, 32 polyphonic independently controlled tracks, 30,000 notes per song, an optional metronome, and more. $99.00.

Beam Team (6100 Adeline St., Oakland, CA 94608, (415) 658-3208) was showing *Transform-Xsyn* a graphic sound editor/librarian series for FB01, DX, TX, JX, and CZ music synthesizers. The program, which simulates the hardware musicians are accustomed to using, offers a sound manager, a real-time recorder, a sound editor, and a RAMdisk. *Transform-Xsyn*, says Beam Team, is a sound/music design system. $99.95.

Utilities

Intersect Software (3951 Sawyer Rd., Ste. 108, Sarasota, FL 33583, (813) 922-6244, (800) 826-0130) was showing *Interlink ST*, a full-featured telecommunications program, which includes autodial; xmodem, xmodem crc, telink, and ASCII file transfers; customized character translation tables; 48-line display; online help; and record/playback. The program takes full advantage of GEM, and Intersect modestly insists that it represents "the next generation in telecommunications." $39.95.

MaxPak from **Softwerx** (P.O. Box 71118, Murray, UT 84107, (801) 272-5623) includes a high speed print spooler; a printer enhancer; a program that calculates algebraic expressions; a program that prints out documents, program listings, and lists; a digital clock; macro keys; a RAMdisk; a screen saver; and access to the ST extended character set. $49.95.

Backup from **MichTron** (576 S. Telegraph, Pontiac, MI 48053, (313) 334-5700) duplicates the contents of your hard disk drive on floppy disks and lets you restore the floppy backups to the hard drive after an accident. "Intelligent" routines give you the option of making full backups of the entire drive, backups of only newly created or modified files, or backups by date. $39.95.■

Question Mark

Atari's Technical Support guru answers your questions about Atari computers

By MARK JANSEN

Welcome to Question Mark. That's me—Mark Jansen—Consumer Technical Support representative for Atari. Each month, I answer hundreds of letters and calls requesting information about Atari hardware and software products—questions ranging from the simple to the obscure. Starting with this issue of *Explorer*, I'll be taking the most commonly asked questions and providing clear, usable answers in this space. If you have a question (or a handy tip) regarding Atari computers, send it to me at: Atari (U.S.) Corp., Attn: Question Mark, P.O. Box 61657, Sunnyvale, CA 94088.

Q I have heard that there will be a new release of ST Basic. What new features will it have?

A The new ST Basic runs faster, takes up less memory, and allows easy access to the ST operating system. Calls to the BIOS, XBIOS, GEMDOS, AES, and VDI are all relatively simple to make. The new version also has a vastly improved floating-point math package for greater numeric accuracy.

Q In ST Basic, if I list a program several times, the list window tends to get cluttered, and when I move around, I'm never sure if I'm looking at the latest listing. Is there a way to eliminate all but the latest listing, to clear up this confusion?

A Yes. Simply type:

```
CLEARW 1 <RETURN>
LIST <RETURN>
```

This will first clear the list window, then list the current version of the program.

Q I have an ST with a monochrome monitor. Sometimes, when I load the Control Panel or a graphics program (particularly *Degas*), I get six, widely-spaced, vertical, black bars on my monitor. What should I do?

A Take your computer to an authorized service center. There, they will perform diagnostics on the machine, determine the cause of your problem, and repair it as quickly as possible.

Q I have an ST with a monochrome monitor. The image on the screen seems to "jitter" up and down. What causes this and how can I correct it?

A This is caused by having a color monitor or the ST power supplies too close to the monochrome monitor. It can also be caused by other large power supplies being too close to the monochrome monitor. Turn off the color monitor and move the power supplies as far away from the unit as possible.

Q I tried reading disks from a new IBM portable on the ST and they read fine. I can also read disks from a Data General One. I can't read disks formatted on an ST with either the IBM or the DG. Why not?

A There are some slight incompatibilities between the two floppy disk formats. If you want to transfer files between the two, format the disks on the DG or the IBM.

Q I have heard rumors about an upcoming "Blitter" graphics coprocessor for the ST. What will it do and will I be able to put one in my machine?

A Atari is developing a graphics coprocessor for the ST which will increase the speed of animation and other operations requiring memory moves. For example, when you move a window, you are actually moving the contents of RAM memory around, so this will speed up in a blitter-equipped machine. Planned as a service-center upgrade to current machines, the blitter will eventually be included in a future machine as a standard feature. The blitter should be finished in the first quarter of 1987.

Q With the current version of ST Basic, can I send or receive data with the RS-232 serial port?

A Yes. You must first be sure you have set the baud rate correctly, both on your ST and on the device (modem, printer, etc.) at the other end of the connection. On the ST, you do this by clicking on the Set RS-232 Config. desk accessory and selecting the baud rate you want. Make sure that both the ST and the unit you are communicating with are set to the same baud rate. Once you have done that, you are all set to send and receive data, using the INP and OUT statements in ST Basic. To send a byte out to the RS-232 port, use

```
OUT 1,X
```

where X is a value from 0 to 255. To send a character, the statement

```
OUT 1,ASC(C$)
```

can be used. The expression ASC(C$) evaluates to the ASCII code of the character stored in C$. To accept input from the RS-232 port, you must first check that a byte is available. Use the statement

```
S = INP(-1)
```

which will set S to -1 if a byte of data is waiting at the port, and 0 (zero) otherwise. If S equals -1, input the actual data using the statement

```
X = INP(1) AND 255.
```

The INP function returns a two-byte value from the port; your data occupy the lower byte. The expression AND 255 serves to "mask off" the useless high byte, so that only valid data are stored in X. To input data directly into a string variable, use a statement like

```
C$ = CHR$(INP(1) AND 255).
```

Q When I try to load some disk programs on my XL or XE computer, I get a message saying "remove cartridge," even though the cartridge slot is empty. What's wrong?

A Older Atari computers, like the 400 and 800, require a separate Basic cartridge, whereas the XL and XE have Basic built-in. To retain full compatibility with older machines, this built-in Basic is designed to mimic a cartridge when it is enabled. It is this phantom Basic cartridge that your programs want you to remove. To do so, simply hold down the OPTION key when booting. Keep holding it down until the disk drive "busy" light comes on, and the program will load correctly.

Q What is the most current version of 8-bit Atari DOS? How can I get it?

A The latest Atari DOS is version 2.5, which works in all Atari 1050 disk drives and some third-party drives. If you received DOS 3 with your drive, you can get DOS 2.5 free of charge by sending your original DOS 3 disk, along with a letter requesting DOS 2.5, to: Atari Customer Relations, Attn: DOS 3 Upgrade, P.O. Box 61657, Sunnyvale, CA 94088. You will receive DOS 2.5 and a mini-manual explaining its use. Please do not send your DOS 3 manuals.

Q I have heard that hundreds of programs are available for my Atari free of charge. Where can I find these?

A These programs, known as "public domain software" because their authors have decided to distribute them free of copyright restriction, are available from dealers, user groups, BBSs, and from Atari.

Check first with your dealer. Some dealers have a large selection of public domain software available, yours for the price of a disk. Most user groups maintain libraries of public domain material, which is usually available for around $5 a disk or so. With a modem (What are you waiting for? The XM301 retails for under $50!) you can call public Bulletin Board Services and download public domain programs for the price of a phone call.

Atari maintains a 24-hour BBS in Sunnyvale, CA, at (408) 745-5308. There is no charge for this service, except what you pay Ma Bell. The Atari Base BBS is also an excellent place to communicate with other users and to ask questions of Atari staffers, myself included. Atari-specific sections of commercial information services like CompuServe and BIX also maintain libraries of public domain material, though their membership and connect charges tend to boost the price of "free" software a bit compared with the other sources mentioned.

Q I have a 600XL computer. Can I use a disk drive?

A The Atari 600XL computer contains 16K of RAM, which is not enough to use a disk drive. For $35, you can exchange your 600XL for an 800XL with 64K of RAM—more than enough memory for disk-based programs. Send your 600XL, along with a check or money order for $35 and a letter requesting an 800XL to: Atari Customer Product Service, 390 Caribbean Dr., Door #17, Sunnyvale, CA 94089. ■

Try This!

Extended Precision Arithmetic: How to do calculations with 100 digits of accuracy

By DAVID H. AHL

Try this with your pocket calculator: clear all entries and press the number 2, the multiplication key, the number 2, and the equal key. Continue to press the equal key and count how many times you can press it before an error is indicated on the display. A calculator with the usual eight-digit display will normally show an error on the 26th key press, i.e., 2 raised to the 26th power. A calculator with a ten-digit display will show an error on the 33rd key press.

Some calculators will then allow you to press the CE key (clear entry) and continue the doubling process, moving the decimal point appropriately. You then lose the least significant digits from the right side of the number. This, of course, is what your computer does automatically when you manipulate large numbers using a floating point package. For most calculations, this procedure of retaining only the most significant digits (usually six or seven) is quite appropriate.

On the other hand, there may be times when it is desirable to perform calculations to a greater degree of precision. Financial institutions, for example, are not in the habit of rounding off balances in accounts when they exceed $9,999,999. Likewise, scientists may well want to calculate the value of a factorial to more than 7 or 16 (double precision for most computers) places. And if you tried some of the compounding problems in the last issue, you may well have run into trouble computing the answers we gave unless you were familiar with extended precision arithmetic.

Thanks and a tip of the hat to Walter Koetke whose article in Creative Computing in 1975 provided a basis for this article.

Extended precision arithmetic refers to any technique that retains every single digit of a calculation. Some language compilers—most notably ones like Cobol which are used for financial calculations—retain as many as 24 digits. However, languages like Basic and Pascal—even in double precision mode—rarely retain more than 17 digits. However, you can write software routines in any language that will retain an arbitrarily large number of digits of accuracy.

An extended precision arithmetic routine for multiplying numbers can be illustrated by computing factorials. Once you see how it works, you can apply the method to other calculations.

You will recall that a factorial (N!) for any integer greater than zero is defined as:

N! = N*(N-1)*(N-2) . . . 1

A simple program to compute the factorial of any entered value is as follows:

```
LIST
10 INPUT N
20 F=1
30 FOR M=1 TO N
40 F=M*F
50 NEXT M
60 PRINT N;"factorial =";F

RUN
? 5
 5 factorial = 120

RUN
? 12
 12 factorial = 4.790016E+08
```

If only six significant digits are available, the results of this program are subject to roundoff error for all values of N greater than 11. Moreover, because most computers—and practically all Basic interpreters—have an upper limit of between 10^{18} and 10^{99}, all of them run out of capacity for evaluating factorials when N exceeds some value between 30 and 69. However, using extended precision arithmetic, we can extend those limits to whatever extreme we wish.

To compute factorials more accurately we need an algorithm for accurate multiplication. Actually, the most logical algorithm to use is simply the one we use when multiplying numbers with pencil and paper.

Consider multiplying 8 × 257. We begin by multiplying 8 times 7. The product is 56, but we write down only the 6 and carry the 5. After next multiplying 8 times 5, we add the carried value (5) to the product (40) and obtain 45. Again we write down only the 5 and carry the 4, which is then added to the next product (8 × 2 + 4 = 20). In other words, after each multiplication, we write down the units digit and carry the digits that remain.

To write a program using this algorithm, we need to separate the units digit from the carried part. If P is the product of two numbers, the carry (C) equals the integer value of P divided by 10, and the units digit (U) equals the decimal remainder, i.e.,

C = INT (P/10)

U = P-10*C

This algorithm can be employed in a program to compute factorials (see Listing 1). The factorial is represented by the subscripted value F, while D is the total number of digits in the answer. As it is dimensioned, the program will compute factorials of up to 50 digits.

```
LIST
10 DIM F(50)
20 D=50
30 FOR I=1 TO D : F(I)=0 : NEXT I
40 PRINT "N="; : INPUT N
50 F(1)=1
60 FOR M=1 TO N
70 C=0
80 FOR I=1 TO D-1
90 F(I)=F(I)*M+C
100 C=INT(F(I)/10)
110 F(I)=F(I)-10*C
120 NEXT I
130 NEXT M
140 FOR I=D TO 1 STEP-1
150 PRINT F(I);
160 NEXT I

RUN
N=? 5
 0  0  0  0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  1  2  0

RUN
N=? 40
 0  0  8  1  5  9  1  5  2  8  3  2  4
 7  8  9  7  7  3  4  3  4  5  6  1  1
 2  6  9  5  9  6  1  1  5  8  9  4  2
 7  2  0  0  0  0  0  0  0  0  0
```

Listing 1.

The heart of the program is in Lines 90, 100, and 110. The product of the two integers is calculated and added to the previous carry in Line 90. The next carry is calculated in Line 100, and the units digit is calculated in Line 110. If you understand these three lines, you understand the fundamental idea of extended precision multiplication.

In this program, all the leading digits (zeros) of the product are printed. This isn't wrong, but it looks peculiar. Before reading further, enter this program and try to make a few improvements. In particular, can you eliminate the leading zeros? Can you increase the number of digits in the product? And can you print the answer with no spaces between the digits? Lastly, can you improve the speed of the program?

Improving the Program

Increasing the number of digits in the product is quiite simple. To do so, we increase the dimensioned value of F in Line 10 and increase the value of D in Line 20. The maximum number of digits is the largest integer that your computer or Basic interpreter will handle, usually 32,768 – more than enough for any sane person.

Eliminating the leading zeros is best done with a flag, say S, which indicates whether a non-zero value has been calculated. As long as the flag remains clear (equal to zero) nothing will be printed, but as soon as a value is greater than zero, everything thereafter is printed. Note Lines 145, 148, and 155, which add the flag routine to the previous program.

```
140 FOR I=D TO 1 STEP-1
145 IF F(I)>0 THEN 150
148 IF S=0 THEN 160
150 PRINT F(I);
155 S=1
160 NEXT I

RUN
N=? 5
 1  2  0
```

Eliminating the space between the numbers is not quite so easy. Actually, it is no problem at all for Atari 8-bit users, as Atari 8-bit Basic does not insert extra spaces. However, ST Basic (and most others) automatically inserts a leading space before all printed numbers for a possible minus sign and a trailing space for readability. We can easily eliminate the trailing space by using the function STR$(X), but that still leaves the leading space. To get rid of it, we must use the RIGHT$ function combined with the STR$ function as shown in Line 150.

```
150 PRINT RIGHT$(STR$(F(I)),1);

RUN
N=? 20
2432902008176640000
```

You undoubtedly noticed, if you tried the program with any values over 15 or 20, that it is very slow. This is because the program always multiplies each integer in the calculation (1 through N) by each of the variables F(1) through F(D-1). Thus when N = 100 and D = 50, the computation loop is repeated 100 × 49 = 4900 times. Even when N = 5, the loop is repeated 5 × 49 = 245 times; that is a great deal of excess work just to calculate 5 × 4 × 3 × 2 × 1. If you increase the value of D to 200 or more to allow for larger calculations, the computation time will increase proportionately, yet the results will be exactly the same.

These excessive computations can be eliminated by the use of a pointer, a very important concept in programming. Essentially, we will use another variable, say P, to point at the left-most non-zero digit in the product. We will then multiply each of the integers 1 through N by each of the variables F(1) through F(P). When N = 5, this procedure reduces the number of repetitions of the computation loop from 245 to 6, or more than 97%. For larger values of D, the reduction is even greater, although as N approaches D, the savings will be less.

To employ a pointer in our factorial program, we start by setting P = 1, i.e., we assume the calculation has a one-digit result. We then multiply each of the integers 1 through N by each of the variables F(1) through F(P). To do this, we change Line 80 to read FOR I = 1 TO P. The pointer does not alter the multiplication calculations, but after the NEXT I in Line 120, we must examine the carry to see if the result has more than P digits and if pointer is to be incremented. If the carry is non-zero, we increment the pointer, perform the carry, and repeat the procedure. If the carry is zero, we can drop through to the NEXT M in Line 130. Finally, because the product contains exactly P digits, we can change the limits on the print loop in Line 140 and eliminate the lines that check for leading zeros.

The modified program—which will handle some very large factorials indeed—appears as Listing 2. Additional improvements are still possible, but we leave it to you to discover them.

***Excessive** computations can be eliminated by the use of a pointer, very important concept in programming.*

Continued on page 48.

```
10 DIM F(100)
20 D=100
30 FOR I=1 TO D : F(I)=0 : NEXT I
40 PRINT "N=";  : INPUT N
50 F(1)=1 : P=1
60 FOR M=1 TO N
70 C=0
80 FOR I=1 TO P
90 F(I)=F(I)*M+C
100 C=INT(F(I)/10)
110 F(I)=F(I)-10*C
120 NEXT I
122 IF C=0 THEN 130
123 P=P+1
124 F(P)=C
125 C=INT(F(P)/10)
126 F(P)=F(P)-10*C
127 GOTO 122
130 NEXT M
140 FOR I=P TO 1 STEP-1
150 PRINT RIGHT$(STR$(F(I)),1);
160 NEXT I

RUN
N=? 5
120

RUN
N=? 15
1307674368000

RUN
N=? 30
265252859812191058636308480000000
```

Listing 2.

Now that you have a computer,
how do you turn it into a useful system
that will do the job you want it to do?

Atari Solutions

By STEVE MORGENSTERN

Lucky you! You have a brand new Atari computer. To help you get the most out of it as *Atari Explorer* has pledged to do, we present here hints and suggestions to help you build a complete Atari system for applications ranging from business to graphics to education and beyond.

The first question all new computerists must answer can come from your next-door neighbor, your Aunt Mildred, or your own spouse, and you may hear it as soon as you open the box or months later. But at some point, somebody will lean over your shoulder and say "Gee, it looks like a real nice computer, but what are you going to use it for?"

We're sure you can handle that question with hardly a second thought. By the time you finish listing all the immediate and potential applications—word processing, education, graphics, music, financial management, games, and so on and so on—your questioner will stagger away, eyes glazed, and you can get back to your machine.

The second question is tougher. That is the one you ask yourself when you are alone again: "How do I get the computer to do all that stuff?"

Your computer is basically just a tool that takes information and reshapes it in interesting ways. Computers are unique when compared with other common tools, because they can be used in so many different ways. However, they are identical to other tools in one important respect—a computer does not work all by itself.

The computer equivalent of the nails, plywood, and building plans you use with your hammer are the additional hardware and software designed for the specific computer tasks you want to tackle. Luckily, Atari computers have a wealth of capabilities built in, and top-quality software and hardware are available—often at less cost than similar products for other systems. Selecting the wrong software and hardware, though, can boost both your investment and your frustration level. Let's look at some ways to ensure that you make the right choice the first time out.

The Question of Compatibility

The primary consideration in setting up a computer system that actually accomplishes something is to make sure the component parts—computer, peripherals, software, and *you* (the most important component)—can all get along.

For example, you want to make sure that the *monitor* you select is compatible with your Atari computer system, so it can display the video information your computer produces. Any TV set will work with an Atari 130XE computer, using the antenna adapter provided with the system. For your ST computer, however, you will be making at least one choice right off the mark—do you buy a *monochrome* monitor (providing a high-resolution, black and white display) or an *RGB* unit (for low- and medium-resolution displays in full color)? On the surface, this choice is simple: Atari makes both high-resolution monochrome and RGB color monitors

Photography by Jeff MacWright

Decide what *kind of a computer user you are and what kind you are likely to become.*

specifically for the ST line, so hardware compatibility is assured either way.

But what about software? Although most packages work equally well in monochrome and color, some significant and popular programs require one or the other. Are these the programs you will be using? Do you have any special physical requirements—susceptibility to eyestrain, for example—that might be accommodated better by one choice or the other?

Deciding on a *printer* can be even trickier. Printers come in several varieties from many different manufacturers (including Atari) and offer a diverse array of features. Unfortunately, there is no comprehensive list of Atari-compatible printers, so be sure that the manufacturer or your dealer can guarantee compatibility before you buy.

Most people choose a *dot matrix* printer for day-to-day work. These printers (the Atari XMM801 and SMM804 are examples) form letters out of groups of dots. Some dot matrix printers can produce text of very high quality (known as *near letter quality* or *NLQ*), as well as high-resolution graphics. Others—like the Okimate 20 from Okidata—can produce top-notch color printouts, but are unsuitable for heavy duty text output.

For higher quality printouts, there are additional choices. *Daisywheel* printers work much like electric typewriters, striking the paper with a fully-formed letter shape on a rotating wheel, but they print at a much slower rate than dot matrix printers and cannot print high-resolution graphics.

Laser printers offer exceptional print quality for both text and graphics, but prices are still quite high—the least expensive runs about $2000. A third choice, for professional-quality printouts of line drawings, is a *plotter*, a device that moves an actual pen across the paper.

How do you choose? Again, the question is one of insuring that the printer will work with your computer; that its capabilities are consistent with the kinds of applications you intend to tackle (both now and in the future); that it is compatible with the programs and materials you use most (some printers can't accept a single sheet of letterhead or address an envelope, for example); and that it is in keeping with your personal taste and the limitations of your pocketbook.

If you want to communicate with other computer systems over telephone lines, you will need a *modem*. Again, the question of compatibility arises. Which modems will work with my computer? With my telecommunications software? With my phone lines?

These are hard questions, and getting the answers right can mean the difference between compromise and real satisfaction with your Atari system. To prevent mishap, you must (as we say in New York) "get yourself an attitude."

Steps to a Winning Attitude

- Consider your Atari system a long-term investment. Add peripherals and software after calm, careful deliberation—don't buy on impulse and regret at leisure. Nor should you, on the other hand, hesitate to spend where necessary to get the capabilities that you want or need. A properly outfitted Atari system can save you hundreds of hours per year, paying for itself many times over in increased productivity.
- Think of applications first—in as much detail as possible; then buy peripherals and software to suit. By doing things in this order, you will be more likely to discover products that will truly serve your needs. Sometimes, you will discover that the way you have envisioned a particular application conflicts with the methods offered by existing software and hardware. If this happens, don't be afraid to re-think your application on the basis of new information.
- Know your limitations, and accept them. Decide what kind of a computer user you are and what kind you are likely to become; then follow the appropriate tack. If you are primarily a dabbler, just trying the computer experience on for size, just relax. A minimum investment of time and money will let you experiment in a number of application areas.

If you are a business or "power user," comfortable with computers and committed to making your Atari an effective productivity tool, you should probably spend a little more money up front to evaluate a variety of competing alternatives and decide rapidly and efficiently what tools you need.

If you are a hacker at heart, time is no object. Beyond a basic system, your initial investment should probably be in documentation, programming languages, and the other fundamental tools you need to "roll your own."

- Cultivate a relationship with your dealer. Atari dealers are plugged in to all sorts of information, both from Atari Corp. and from third-party suppliers of

Atari-compatible hardware and software. They are usually eager to help you make the right decisions about your system, and some have very strong and valuable opinions. Most will let you try out new software and hardware releases before you buy—the best assurance you can have that you are getting what you want—and many provide continuing support for the products they sell.

•Get "plugged in" yourself. Join a local Atari user group and take advantage of the mass of experience and support such groups provide. Users group members are often privy to inside information, receiving word on new products (and sometimes the products themselves) months before the general public realizes they are available.

Often, too, groups sponsor equipment and supply cooperatives, evaluating and purchasing products in quantity at discount prices. And user groups are always a resource of information, new ideas, and just plain fun.

Frequently, having the proper attitude, knowing what kind of user you are, having your applications straight, and cultivating the right sources of information will make certain kinds of problems disappear.

For example, you can use a wide-carriage Epson (or other Centronics-compatible parallel dot matrix printer) with an Atari 130XE. However, you will need an *interface* to set up a communications channel between the computer and the printer, and this interface will have to be set up according to certain technical specifications before it can exploit the special features of the printer. Software may also have to be adjusted or *configured* to work with the printer.

While most self-respecting hackers and competent power users can perform these operations, they do take time. If you don't have the time, or if you are a more casual user who doesn't anticipate needing the wider carriage and higher speed of the Epson, there is an alternative—a "path of least resistance." Atari's own XMM801 standard-carriage dot matrix printer plugs right into the 130XE—no interface required—and works with most standard software. Many users will find it a safe and sufficient choice.

Resources Aplenty

Where can you go for specific, up-to-the-minute answers to questions on compatibility and desirability of hardware and software? As mentioned above, Atari owners have rich resources to draw on. Atari computers are blessed with perhaps the most enthusiastic users in the world.

Atari computers are blessed ***with perhaps the most enthusiastic users in the world.***

That may sound like hype, but as someone who started out in computing several years ago with an Atari 800 and has gone on to work with several other systems, I am constantly amazed at the level of commitment and expertise found in the Atari user community.

These are people who latch onto a system, whether a member of the resilient 8-bit line or one of the powerful ST computers, and learn everything there is to know about it, squeezing every ounce of performance out of the machine. Not only are they extraordinarily knowledgeable, they are also happy to share their knowledge with others, enthusiastically welcoming newcomers into the Atari fraternity.

Many of these Atari devotees have banded together in user groups, spread across the country and around the world, which meet periodically to discuss recent releases and discoveries, trade tips and public domain (uncopyrighted) software, and generally enjoy the common interest they share. The odds are excellent that there is an Atari user group in your area—to find out, call Atari's user group information number, (408) 745-2021, and talk to Sandi Austin.

And while we're on the subject of telephones, there are many phone-based "user groups" open to anyone who has a modem hooked up to his computer. The experience is very similar to an in-person user group meeting—questions and comments, expert advice, and public domain software available for downloading over the phone.

Some of these Atari Special Interest Groups (SIGs) may be part of a larger

information service like CompuServe or the Source, while others are run as independent computer Bulletin Board Systems (BBSs) by organizations, dealers, and individuals.

Atari even runs its own multiline BBS, Ataribase—(408) 745-5308—and has a list of other boards you can call, as well. You usually need only one number to get started; virtually every computer bulletin board includes an extensive listing of other numbers you can call.

Atari-specific magazines (like *Atari Explorer*, if you will permit us a moment of unabashed self-approbation) provide timely and accurate information gathered from a variety of sources, review products, and feature tutorials, columns, and other material designed to help you get the most out of your Atari computer. Most magazines contain a mix of features—some aimed at beginners, some at more advanced users, some at 8-bit Atari owners, and some for the ST, in equal proportions.

Recommendations

To get you started on the right foot in configuring a complete Atari system, we spoke with several experienced Atari computer users from various user groups across the country and asked for recommendations on hardware and software solutions for tackling particular computer projects. Here are their expert opinions.

Education

Steve Tearle, a teacher at Richmond Elementary School in Dade County, FL, has extensive experience with both the XE and ST computer lines in an educational setting. He describes his work with Atari computers as follows:

"For teaching programming, I much prefer the Atari to any other system. Atari Logo for the 8-bit machines is the best Logo out there—no ifs, ands, or buts. It supports a lot of commands—especially in sound and graphics—that other Logos can't even touch. That goes for the ST Logo, too. And ST Basic supports sound and graphics commands that virtually no other microcomputer offers. Teaching sound and graphics in Basic on the Atari is a pleasure.

"We're setting up a pilot program with the art department now, using Atari ST computers, Okimate 20 color printers, and a range of graphics software. We plan to start the kids on *Neochrome*, Atari's own paint program, then move them into *Degas* (Batteries Included) for more advanced work. *Degas Elite* is a more complex package, so we'll try it with the gifted children.

"Educational software is getting harder to find, but it's there if you look for it. We use *Math Blaster* (Davidson & Associates) a lot, along with much of the software from MECC (Minnesota Educational Computing Consortium), including those classic simulations, *Oregon Trail* and *Lemonade Stand*.

"For educators, the software basics for an ST system include Basic, Logo, *Neochrome*, and *1ST Word* for word processing—that's enough to keep students busy for quite a while."

Business Graphics

Jim Hood has set up a business called Hoodwink in Oakland, CA, which turns out presentation graphics for clients using Atari 8-bit and ST computers. He uses a variety of software to create the images and text he wants.

"I've done slides on everything from *Graphic Master* (Datasoft) on the 8-bit machines up through *Easy Draw* (MiGraph) on the ST. What I mainly look for are programs that give me nice, clean fonts—not necessarily fancy things, but fonts that I consider nice-looking."

One useful tool Jim employs for adding graphic images to his work, for business and for pleasure, is ComputerEyes, an inexpensive *digitizer* from (Digital Vision) that uses a video camera to capture an image and feed it into the computer. "During the Statue of Liberty craze I created a picture of the statue holding up the Atari symbol, and instead of a book, she has an Atari computer tucked under one arm. I digitized an original picture, then transferred it from the 8-bit to the 16-bit and spent some time redoing it all using *Degas* graphics software."

Another neat trick Jim uses to get graphic images into his computer is to project a slide onto his computer monitor, then trace around it using a drawing program. "If it's on the 8-bit, I use the KoalaPad (Koala Technologies) with *MicroIllustrator* software, or I use the mouse and *Degas* on the ST. I get an outline that way, and then go in and do the coloring and modifying from that. My wife says that's cheating, but I like the results."

Jim let us in on an ingenious technique he uses to transform the on-screen image he creates into a slide ready for projection. He prints the image on a dot matrix printer, then shoots the printout with a 35mm camera and Kodak S0279 film, a special film used for making slides from negatives. "By using different color paper and ribbons you can get different color backgrounds and type. I usually use orange paper and a black ribbon. Shooting it with this film gives me a slide with white letters on a blue background. Sometimes, I'll use different colored ribbons in multiple passes on the printer. Red, blue, and black ribbons give me yellow, green, and white lettering."

CAD (Computer-Aided Design)

"The development of CAD on the Atari ST system has importance that goes beyond bounds of Ataridom as a viable alternative for the architectural office, or any other drafting profession in providing a low-cost workstation. I'm looking at being able to set up a complete, freestanding workstation for under $3500 right now."

The speaker is Jack Durre, a professional architect who uses his ST "8 to 10 hours a day, every day—I don't even take weekends off." He gets plenty of use out of the system in his professional life, as editor of "Atari Journal," a monthly 24-28 page magazine that grew out of the Dade Atari User Group (DAUG), and as a fervent telecommunicator.

Jack's system consists of a 520ST, two double-sided drives, and monochrome and color monitors. "Originally, the monochrome simply sat on the shelf and I used the color for all my text work and everything, but lately I've grown very attached to the high-resolution of the monochrome in the CAD programs I've been using, so now I use that for the text work, too."

Jack is enthusiastic about *ST Writer*, a popular public domain word processing program for the ST. He uses it for his billing and letters, and to prepare the magazine. "It allows me to do multiple columns, and I find it faster than any of the others."

Jack is also very pleased with his NEC P6 Pinwriter printer, a 24-pin dot matrix printer he calls "the poor man's laser printer. It offers a higher resolution than a laser printer—360 x 360 dots per inch, as opposed to the laser printer standard of 300 x 300 dpi."

Jack sees *Drafix 1* (Foresight Resources) as "the leader, all the way around" in the current crop of CAD software, but uses other programs for specific purposes. "*CAD 3D* from Antic

Software is a very handy visualization tool, and will be much more so with the additions (program author) Tom Hudson is making to it now – adding real world scaling and a few other features. *CAD 3D* is great because it allows you to visualize a general shape, particularly for people who can't think in three dimensions.

"*Degas* is a really useful tool for presentation purposes. *First CAD* from Generic Software is not necessarily for the architect, but is great for the business professional who wants to do a little graphics work in the office.

"*Easy Draw* is another powerful design program. It is difficult to master, but it does do certain things that no other program does yet, particularly for presentations. I use that in my business right now, for title blocks and things of that sort."

While his ST can't replace hand drawing in his architectural practice yet, its capabilities are growing steadily. "I can ease them into my practice; it's not as though I have to stop drawing with a pencil altogether and move over to the computer today. I can jump back and forth and increase the size of the workload that my computer is taking as time goes on."

Business Management

David Groves bought an 8-bit Atari in 1980, "mostly for *Star Raiders* and the other games. I also thought that I could probably use the Basic language for some business purpose or other."

In fact, he has become an expert on Atari use in the business environment, having used both XE and ST machines in his work as a mortgage banker. Not only does he know his stuff, he is available to share his knowledge with anyone who has access to the CompuServe Information Service. You will find him (along with other Atari gurus, including *Degas* author, Tom Hudson) on-line almost every night in his role as Senior System Operator for the Atari ST Special Interest Group.

Dave has brought the power of the 8-bit Atari line to bear on the task of preparing escrow analyses. "In escrow analysis, basically you take the amount of money the customer has on deposit and determine the amount needed to cover taxes and insurance in the coming year; you then determine whether the principal amount is short or excessive.

"We had about 250 borrowers, and were doing the job manually. I the switched to *Data Perfect* and *Letter Perfect* (LJK Software), and for about $600 I was able to do these escrow analyses by computer and send very complete reports to all my borrowers."

While the bank has moved on to a networked computer system, Dave uses an Atari ST for the work he brings home and reports excellent results. He recently prepared some graphics using an IBM system and a laser printer at his office. He then took them home and entered the figures into his ST, using *VIP Professional* to produce charts and *Degas* to retouch them before printing on a Panasonic 1091 dot matrix printer.

"When I showed both sets of graphics to the chairman of the board prior to the board meeting, he much preferred the printouts I had created with the ST system."

Dave feels that the software now available for the ST makes it a very solid business tool. "For my use, I'm very happy with *VIP Professional*, *DBMan*, and *ST Writer*. *ST Writer* has a real nice price, being free, and *DBMan* and *VIP* are both totally comparable to IBM programs costing twice as much (*DBMan* is more powerful than *dBase III*, as far as I can tell)."

Information at the Right Price

By following the suggestions listed above and taking advantage of the resources available to Atarians around the world, you will soon be well on your way to configuring a powerful, friendly, and affordable Atari system.

As you put together your system, remember that Atari Corp. is behind you with quality products, with customer and dealer support and service, and with publications like *Atari Explorer*, committed to helping you get the most out of your Atari computer system. Welcome to the world of Atari! ■

Magnification, multiple drawing screens, color-cycling, and many more outstanding features adorn the newest paint program from Batteries Included

Bridge by Parker McGee and Virginia Neuman

Degas Elite

System: Atari ST
Price: $79.95
Summary: Everything you ever wanted Degas to be—and more.
Manufacturer:
Batteries Included
30 Mural St.
Richmond Hill, ON LB4 1B5
(416) 881-9941

A few disks are software essentials in any Atari ST library. One is a word processor; another a telecommunications program. The third is a paint program of some kind. After all, what's a computer like the ST for if not to produce some eye-popping graphics on the screen?

Among paint programs *Degas* from Batteries Included, which was released soon after the ST itself reached dealer shelves, soon emerged as something of a standard. Its graphics capabilities were truly impressive, yet it was easy to learn and easy to use. It allowed you to create in both low- and medium-resolution color modes and high-resolution monochrome as well. It offered more features than any other program available at the time.

And yet, there were a number of quiet omissions in *Degas*, which limited its capabilities. Four omissions could be called critical: There was no zoom or magnification mode, no scaling potential, no ability to rotate blocks, and no space for primitives to reside. Even lacking these, the program was still very good. But if these important features could somehow be incorporated . . .

After a wait that had computer artists champing at the bit, Batteries Included has finally brought us *Degas Elite*. It includes all the features listed above, plus a whole lot more. It is more logically organized and more intuitive to use, and features a smoother, surer mouse interface than its predecessor.

Degas Elite allows you to draw in any graphics mode. You can draw freehand or make use of tools that let you draw perfect lines, rectangles, circles, ellipses, polygons, boxes, discs, and rays. In addition to the airbrush offered in the original version, a Stipple selection, which is like an airbrush with a custom tip that you can design, has been added to *Degas Elite*.

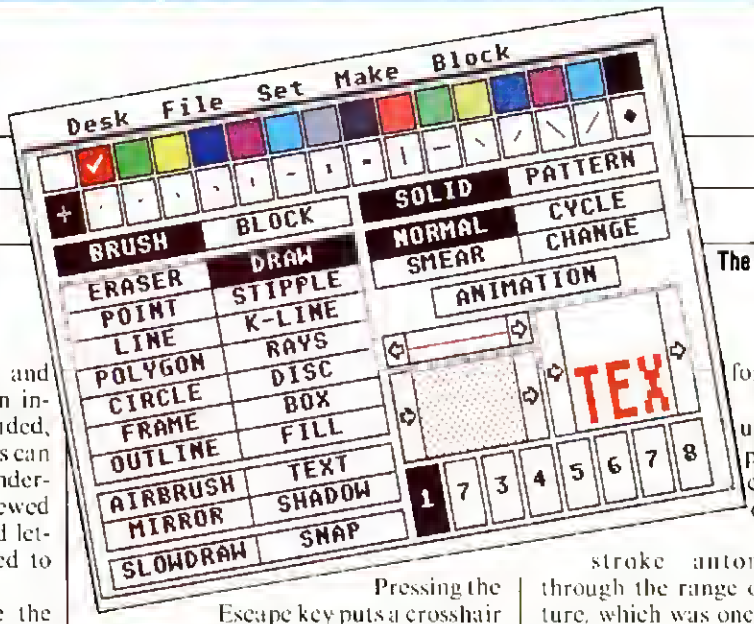
Another new feature, Smear, allows you to semi-randomly mix-up the pixels within an area the size of your selected brush. It is handy for smoothing boundaries and smudging sharp contrasts into fuzzier ones.

Mirror allows you to draw symmetrically across up to six axes, while Outline draws an outline around whatever shape you specify. Slowdraw makes the mouse into a very precise instrument, while Snap allows you to align shapes on a grid. And Shadow lets you offset another color from your main color in any of eight directions, with an offset of 1 to 16 pixels.

The Fill function of *Degas Elite* has been substantially refined. In addition to the single-color fill patterns of the original program, pleasing and sophisticated multicolor fills are now available (in low-res color mode). Or, you can design your own. The fills are fast and repeatable—you can always fill an area, even if it has been solid-filled before, as long as your fill pattern is of a contrasting color.

The palette and text functions have also been improved. Now colors can be moved from one paintbox to another, and "tweaking" between shades of a single color has been made much easier.

By JOHN J. ANDERSON



The main menu screen.

Palettes alone can now be loaded and saved, leaving the graphics screen intact. Conversely, images can be loaded, leaving the palette intact. Text fonts can be loaded as well; and text can be underlined, thickened, lightened, skewed (italicized), or outlined. Shadowed letters are possible, and can be used to dramatic 3-D effect.

Most impressive, however, are the additions that remove *Degas Elite* from the ranks of the very good and make it superlative.

Magnify expands an area of your drawing to about a third of the full-screen size, so you can work on it in more detail. By pressing a function key, you can move from 3× to 12× magnification. (At 12× magnification, each pixel is nearly the size of a dime.)

In the magnification mode, the top of the screen displays a palette, scrolling arrows, and a toggle for the level of zoom you want. The left side of the screen shows the real size of your graphics, while the right side displays the magnified version.

You can draw in the magnify mode just as you would upon the regular drawing screen. Magnify gives you total control over every pixel on the screen of your Atari ST.

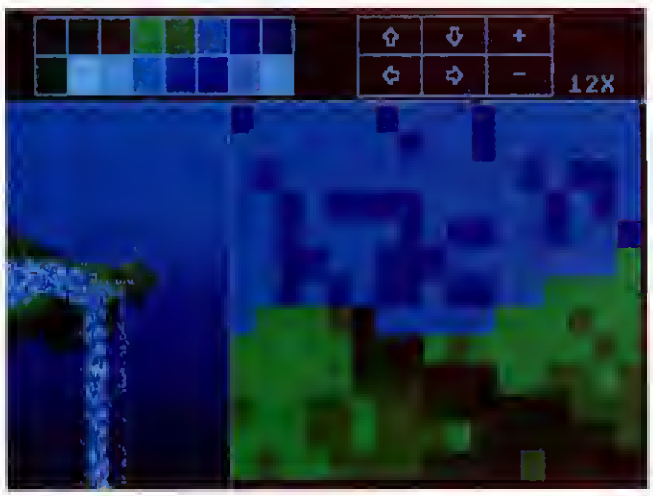
Blocks

The concept of Blocks has been considerably expanded in *Degas Elite* and offers a whole new range of capabilities. Pressing the Escape key puts a crosshair on the screen, which can then be used to define a block. In this way, graphics can be moved and copied.

The Stretch command allows you to scale a block up and down vertically and horizontally. Rotate allows you to turn a shape to the angle you specify. Horizontal and vertical Skewing allow you to offset either the top and bottom or sides of a block. Distort lets you move each corner of a block to a different position on the screen and distort the image quite radically. You can even overlap sections of the block itself and fold the image upon itself. In addition, individual blocks can be saved to and loaded from disk.

One of the most powerful additions to *Degas Elite* is the ability to provide color-cycling animation to graphics screens. Animation permits you to cycle a selection of colors in your palette automatically. If your imagery and palette are carefully orchestrated, the effect can be extremely effective. You can define up to four sets of animation palettes and set individual speeds and directions for each.

Cycle is a tool that uses the animation palette to define its colors. When you draw with a Cycle brush, the brushstroke automatically cycles through the range of colors. This feature, which was once available only on graphics workstations costing thousands of dollars, now literally shines on your Atari ST.



A small section of the picture on the left is magnified 12 times on the righthand side of the screen, allowing subtle changes to be made.

Multiple Drawings

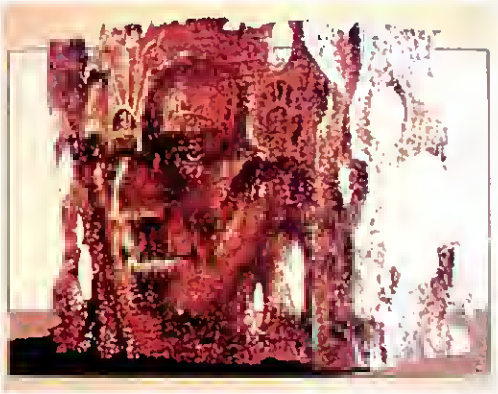
Perhaps most important, *Degas Elite* now supports multiple drawings or worksereens, depending on your memory configuration. A 520ST will support four simultaneous sereens; a 1040 will support up to eight. To select a screen to work in, you need only click on a numbered box at the bottom right of the main menu.

Multiple sereens give you the ability to work up a library of graphics primitives for use in creating more complex drawings. You can load a number of sereens simultaneously and move graphics between them. The only limitation is that all worksereens operate under the palette of sereen 1.

Disk Options

The disk options of *Degas Elite* are also greatly improved. Set Drive allows you to set the default drive (not path) from which to load and save files. You can load pictures from original *Degas*, *Neochrome*, and Koala Pad formats, as well as Amiga .IFF format pictures (using the Electronic Arts file format). You can also move images within ST resolution modes—monochrome to low-res color or high-res color, for example, or vice versa. When you load a picture saved in a different resolution from the one you are using, the picture is translated line by line, and the image is processed and adjusted to achieve the best possible rendition of color densities.

Degas Elite also features an automatic compression routine which reduces the size of a standard picture file from roughly 34K to anywhere between



Stoneface by Darrel Anderson

10 and 24K. Several factors should be considered in deciding whether or not to use compression: Some word processors now allow you to include graphic files such as *Degas* pictures in them. They usually require an un-compressed file, however. Translation programs, which allow you to turn *Degas* pictures into other format files also require un-compressed pictures to translate properly.

On the other hand, you can fit many more compressed pictures on a single disk, and *Degas* can read them without modification. If you are putting together a slide show, for example, the compression feature of *Degas Elite* can increase the scope of your presentation quite a bit. (An improved slide show program is included on the *Degas Elite* disk, along with a set of printer drivers and a font editor.)

All commands except those on the pull-down menu bar can be activated from the keyboard. This is an excellent feature, and one we have come to expect from Batteries Included. It ensures that as your proficiency increases, the point-and-click interface that initially made the product easy to learn does not itself become a hindrance. You can move from point-and-click to selected keyboard commands at your own rate.

Documentation

The documentation accompanying the package is clear, well-written, and well-organized. If I were to pick any nits, it would be to point out that the index can be a bit maddening—it points to every occurrence of the word you seek, with no hint of where the "meat" will be found. One example: Disk: 1, 3, 4, 9, 14, 43-46, 51, 53-56, 59-62, 64, 66, 67, 69, 81. This makes for an impressive-looking index, but doesn't really help the user very much. (It is a frequent problem, now that indices are almost always compiled by computer.) The documentation is also perfect-bound, which means you have to break its spine to get it to lie flat and open. Pages are coming loose from mine already, so please treat yours carefully.

But it is the software that counts, and *Degas Elite* is probably the best piece of software that has appeared for the Atari ST to date. If you have *Degas* and use it regularly, you will want to upgrade. (Return your *Degas* disk to Batteries Included along with $40.) If you have put off buying a paint program for the Atari, be assured that the time has come.

Tom Hudson, the author of *Degas* and *Degas Elite*, has scored once again—this time with a superlative program that leaves absolutely nothing to be desired. Now if only he would get to work on an animation program of the same caliber . . . ■

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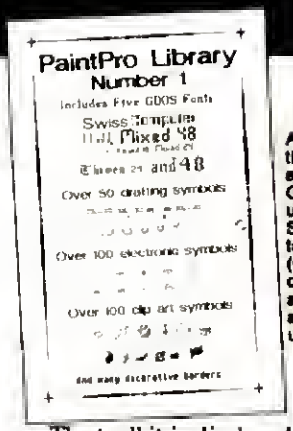

A valuable companion to the ST PaintPro package. Includes five new GDOS fonts that can be used with PaintPro—Swiss, Computer, Chantal, Mixed and Thames (Old English). Hundreds of symbols (electronic & architectual), borders and artwork that can also be used with Degas. $29.95

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Design, Sketch, Draw, Illustrate, Doodle, Cartoon

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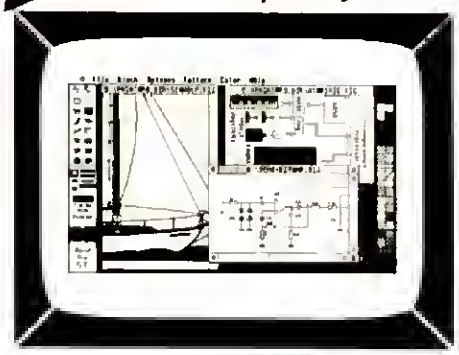

The toolkit is displayed on screen—just point to the icon and click. The toolkit contains many tools for your convenience—add text, draw freehand or straight lines, spraypaint, paint with the brush, draw boxes, circles and ellipses or zoom in to do fine detailed work. Edit and save your own fill and line patterns. Use block operations to cut, paste, delete, rotate, invert and save sections of your drawings. The extensive text capabilities allows you to use up to six GDOS fonts in different type styles (bold, italics, outline, etc.) or reading directions. The forgiving right mouse button permits you to *undo* a mistake you might have made. Tells you how to create your own printer driver so **PaintPro** can work on virtually and printer. An added program included will convert full-page MacPaint™ pictures (available from various Bulletin Boards) to full-page **PaintPro** pictures. $49.95

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Having everything in a package makes development a dream...as long as each of the components are good—and in AssemPro, each component is great!...I wish I had it (AssemPro) a year and a half ago...it could have saved me hours and hours and hours—
Kurt Madden, ST World

...A wonderful package...The whole system is well designed and makes the rapid development of 68000 assembler programs very easy—
Jeff Lewis, Input

The Complete Development Package for the Atari ST

AssemPro

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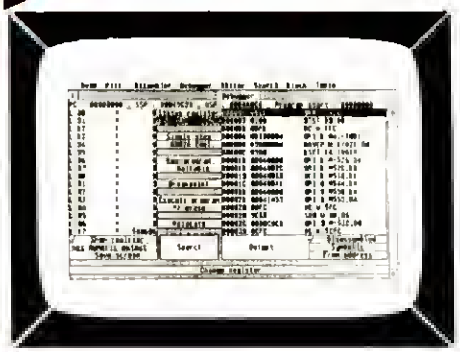

AssemPro is a *complete* machine language development package for the professional programmer. This full-fledge package contains it all—Editor, Assembler, Debugger and Disassembler. The powerful editor has full block operations, search command and undo. The fast assembler creates an automatic error file. If the assembler encounters an error, it stops, displays the error and then allows you to correct the error and continue assembling. Supports four types of constants: binary, decimal, hex and string. Allows for three types of "include" files: normal ASCII, binary and library. The extensive macro library contains all of the GEMdos, BIOS, XBIOS, AES and VDI calls. Supports conditional assembly and creates relocatable code. The unique symbolic debugger lets you single-step through your program, set 16 breakpoints and display and edit the 16 registers. **AssemPro** is available on single-sided diskette. Not copy protected. $59.95

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David Small talks about Macintosh emulation for the Atari ST

Somebody said that it couldn't be done
But he, with a chuckle, replied:
That "Maybe it couldn't," but he
would be one
Who wouldn't say so till he tried.
—Edgar A. Guest

How D'ya Like Them Apples?

In our recent Reader Survey, we asked *Atari Explorer* readers which authors they would like to see writing for the magazine. Among the most frequently mentioned were David and Sandy Small, whose early "Outpost: Atari" columns in *Creative Computing* earned them something resembling cult figure status in the Atari community.

So we gave them a call, and although their life has been hectic lately, they agreed to do some writing as soon as things settle down. Dave has been devoting most of his time to his new company, Data Pacific, and the development of the Magic Sac Macintosh emulator, a process we thought would be of interest to our readers, so we spent some time talking with him about it . . .

AE: You've been in this business for quite a while, haven't you? Why don't you tell us how it all began.
DS: Well, I started hacking Hewlett-Packard computers in 1974 when I was in high school, and in 1976 I went to Colorado State and got a computer science degree. I escaped in 1980 and did a short stint with Control Data and another with TI. When I was at TI, I got involved with the Atari and started writing for *Creative Computing*.

AE: Have you been an Atari person, then, since you got into microcomputers?
DS: Yes, pretty much. I've played around with other systems a little, but the Atari line is certainly what I'm most expert in.

AE: Of course, you learned enough about the Macintosh to write a software emulator for it.
DS: Well, yeah. It wasn't planned that way. I didn't really want to learn all about I/O cues and the operating system Attach/Detach, but I had to.

AE: When did the idea for the Magic Sac first occur to you?
DS: That would have been in about March 1985. The ST was new and had been shown at various shows, but you weren't allowed to touch the machine. The first STs were shipped in about June of '85, and it was then that I started thinking, "Gee, why can't this run Mac software?"

There were some really obvious reasons, like it didn't have the operating system toolbox and it didn't have the Mac disk drive, but I started digging into the hardware and discovered that there really wasn't any reason that it couldn't run Mac software if I did the appropriate work. As I got into it, I found that there were a thousand reasons that it couldn't have worked—and none of them turned out to be true.

By about September '85, I had really dug into the memory maps and got out all my old *Byte* articles on how the Macintosh worked. I had a little bit of documentation on the Atari, and I really felt that it was possible to do. So I went to Comdex in '85 and talked with a guy I had known for years; he agreed to finance it if I would write it. And that's when it officially started.

My backer was the best man at my wedding—I've known him since high school: his name is Joel. We brought some machines home from Comdex and got to work.

AE: So, you worked all by yourself on this thing. How long did it take to put together?
DS: The first revision took about three months—it was really awful. What I typically do is get up at about two in the afternoon and drink coffee and settle down to work. During that time, Sandy would watch the kids so I could sleep, and I would work during the night when the kids were quiet. In November, I got it to the point where it thought it was a broken Macintosh—it popped the sad Mac screen up at you. December I spent writing the debugger so I could figure out what was going on, because it was crashing a lot and I didn't know why. Then in January we got the desktop working, and we got the mouse and the keyboard drivers up; we demonstrated it for the first time in February. So it moved right along.

It's 13,000 lines of code. I can't even assemble it to the printer any more because it crashes—it's too big.

AE: What assembler did you use?
DS: AS68 from Digital Research.

By JOHN JAINSCHIGG

AE: So the project was mounted primarily on the ST, not on the Macintosh. How did you go about getting into the Macintosh to the point where you knew what was going on?
DS: I read *Inside Macintosh*, and then I read *Inside Macintosh*, and then I reread it. *Inside Macintosh* is a pretty funny book. You have to read the whole thing over and over and over again before it starts making sense. You can't just dive in and look at any one piece.

AE: So there's no point in it having an index, which is lucky because, at least in the versions I've seen, it doesn't have one.
DS: It was really awful. I didn't know that much about the Mac; we had a Mac at home, because Sandy was using it. I started doing disassemblies and listing what I got out to the printer, and when I was done I had a printout two inches high that was the Mac ROMs. Then I started tracing what it would do when it started up, and found all kinds of weirdness. They would pop the stack into the top of memory minus two, which is completely illegal, and God only knows what it does. So I had to make some educated guesses about what some things were doing. It took a long time.

AE: What does the Sac actually consist of?
DS: It's a cartridge board that you plug the Macintosh operating system ROMS into. It has a real-time clock with battery on it, and there are a couple disks of software—one in Macintosh format and one in Atari format. The software glues the Macintosh ROMs into the Atari hardware. There are disk-copy utilities, format utilities, and a transfer utility that gets stuff from the Mac via telecommunication.

AE: So you have to have access to a Macintosh to load applications from Macintosh disks into the ST. What happens then?
DS: Once you have transferred a piece of software over, you can save it on an ST disk and load it normally after that. Of course, public domain Mac software available on bulletin boards can be downloaded to the ST directly, so you don't absolutely need access to a Macintosh to make the Magic Sac work.

AE: Don't you view the porting process as a drawback?
DS: Only when you're dealing with copy-protected Mac software. The transfer utilities can't read it from the disk at the Macintosh end. Otherwise, it's not that hard.

"What I typically do is get up at about two in the afternoon and drink coffee and settle down to work."

AE: What degree of success have people had in getting things to run once they are ported over?
DS: The Sac generally does pretty well. It's more the exception than the rule that something doesn't work. The list I have says 88% of software should run, though that figure changes as we test more and more.

Actually, you know, the Sac runs things about 20% faster than the Macintosh does, because we do two things that are clever. The first is that we have a built-in RAMdisk that you can use if you want to, and that really makes it zip along. The second thing is that Atari's processor runs at just about 8MHz. The Mac processor is supposed to run that fast, but it doesn't, really. It sits and fights with the video so much that it runs at about 6MHz, so we really do pick up a good honest 20% in horsepower.

AE: So, once the software gets into the ST, what actually happens? You've built a memory map in the ST that contains these Macintosh ROMs at the expected addresses. So a program can access the Mac's QuickDraw and other operating system routines in the normal fashion? What about programs that talk to the hardware?
DS: Mac programs generally stay out of the hardware, so we didn't have the problem of intercepting attempts to write to registers and so on. That's because in the beginning, the development system for the Mac was the Lisa, which has different hardware. So, generally programmers tend to work legally through the toolbox. Also, calls to the Mac ROMs run at full speed, whereas calls elsewhere in memory fight with the video. So Mac programmers have really been encouraged to keep their programs legal, and as a result, the vast majority of software runs on our box, simply because it never talks to the hardware.

He began keeping programmer's hours long before he became a programmer.

AE: Have you a list of software that has been found to work?
DS: Yes, it's up to about 100 items; it's not yet "extensive," but we put the list on the release disk in a file called README, along with 88 other bits of vital information.

AE: There are a couple of categories of software the Macintosh is known for: one is desktop publishing, and the other is music software—MIDI control stuff. Have you had any luck running these kinds of software on the ST under Magic Sac?
DS: Yes to the first. *ReadySetGo* and *PageMaker* (two Macintosh desktop publishing packages) work fine. In fact, *ReadySetGo* seems to be the demo of choice for the product.

The problem with MIDI is that the Mac people didn't design their serial port to run at MIDI speed, so if you want to use the serial port for MIDI transmissions, you have to go straight to the hardware. That, of course, invalidates our device.

AE: Can you boot any version of the Finder (the Macintosh's desktop file management system) you like? I know many versions are now in use.
DS: We support Finder versions 1.0 through 4.1. The 5.0 and subsequent versions don't necessarily need, but want the 128K ROM upgrade, which we will eventually emulate, but don't as yet. They have HFS (Hierarchical Filing System). Finder 3.2 won't work, because of a bug in Apple's code; I've been tracing and tracing, trying to find a way around it, but haven't as yet.

David began training for a leadership position in the computer industry at an early age.

"The Atari's processor runs at just about 8MHz. The Mac processor is supposed to run that fast, but it doesn't."

AE: I understand that Magic Sac is already in its third release.
DS: Yes, we keep finding little bugs and fixing them. Generally, what we're doing now is fixing problems in the operating system software.

AE: So the changes are in software, not hardware.
DS: Right. The changes are all pretty minor – like in Revision 3, *MacWrite* works and in Revision 2 it had bugs. And there was a real strange bug in the serial driver that we fixed, so *Switcher* (a Macintosh "context-switching" utility) works now. It's just a kind of gradual improvement.

AE: What kind of problems have you run into with people having to obtain the ROMs?
DS: Back in May, Apple wrote us a letter that said, "We don't want you to use the name 'Mac' (MacCartridge was the original name), and we don't want you to sell the ROMs." We said, "OK, OK," and we don't do either of those things. We haven't heard from them since.

The main thing about the Mac ROMs is that they seem to be very widely available. A lot of dealers have not necessarily mailed the ROMs back to Apple when they have done the Mac 128K upgrade. It's all quasi-legal ground about whether or not dealers are allowed to sell them.

AE: Has Apple tried to put pressure on dealers not to sell the ROMs to people who want to use them with Ataris?
DS: No, the only place we heard of that happening is in England. Apple U.K. reminded its dealers that the ROMs were Apple parts.

Back when we first showed the Sac at the West Coast Computer Faire, one columnist noted that you could load the ROMs from disk, and that really panicked Apple. I understand why, so we made some changes to the code, so it would be very difficult to use a disk version. And we even made it so it didn't work with EPROMs. Then we test the ROMs in software all the time to make sure everything is legal.

AE: So you are working in very good faith to keep people from ripping Apple off.
DS: Oh yes. Ultimately, I think Apple has more to gain than it does to lose from our project.

AE: But nobody from Apple has come to you with any kind of overture of friendship?
DS: No.

AE: Their attitude is "wait and see," then. What about Atari?
DS: Atari was initially enthusiastic and continues to be so.

AE: So where do you go from here in terms of developing the product? Is there any possibility of you rewriting the ROMs in such a way that copyright is not infringed, but you have essentially your own complete product?
DS: I know three companies that have done studies on what it would take to redo the ROMs. The problem is that with the recent Broderbund ruling, people are afraid that they might do a completely legit re-engineering of the ROMs and still be sued, because, apparently, a similar "look" and "feel" have some sort of substance as evidence of infringement. That has scared a lot of people.

The second thing is that we think it would take about a year and about $150,000 to re-engineer the thing. And that could be hopelessly optimistic. It would be tricky.

AE: So the fortunes of the Magic Sac are tied to continuing availability of the ROMs, among other things. From a user's point of view, then, is this a risky proposition?

DS: Well, not as long as the ROMs are still available. We generally find people who purchase the Sac already have the ROMs.

It's funny: when we did our first mailing back in March, we had a little box on the card that said, "Do you want Mac ROMs?" Most of the people who sent it back said, "No, we don't. We can get them. No problem." I was surprised.

AE: What kind of numbers are you actually talking about in terms of bought units in the field?
DS: Bearing in mind that this will be way out of date by the time it appears in print, I'll tell you that we have shipped 1000, and we have orders for another couple hundred.

AE: At the moment, the people I know who are intoxicated by the idea of the Magic Sac are all very up on what's happening in the Atari world. They are people who hear about it through user group scuttlebutt: they're basically hackers. It has not made a big splash yet with the man in the street. Most people have heard rumours about it, but have no hard information. How are you planning to reach the more casual user? And how is the product going to appeal a person who isn't technically sophisticated enough to know what you mean when you tell him he has to buy the ROMs separately?

DS: Well, that really is a tough issue, because we need to play square with Apple; we can't get around the problem of having the user obtain and install the ROMs himself. Generally, we have found that Atari's approach of going to user groups and letting them handle a lot of the support and do some of the selling works really well. In the Atari world the user groups are almost the last organized sales force there is.

AE: Are you getting into the user groups?
DS: We've done a user group mailing and given them offers.

AE: That's great. Are they taking you up on it?
DS: It's still too early to tell.

AE: What about availability of software? It would be simpler to use the Sac if people could buy Mac software on ST-compatible disks. Have you made any overtures to Macintosh software people to make their software available in ST format?
DS: Oh, yes. And the one problem they have is that back when we were talking with the software people the cartridge was not on the market. So they took a "put up or shut up" attitude. Now that we've made it, we're talking with them again.

"We have found that Atari's approach of going to the user groups and letting them handle a lot of the support and do some of the selling really works."

AE: What about the rumours of a disk drive for the Magic Sac that will permit reading Mac disks directly?
DS: That's all true.

Enjoying one of his pre-Atari hobbies.

AE: It will be a hardware addition to the ST?
DS: Actually a hardware enhancement to the ST floppy drive. We'll probably just plug it between the disk drive and the Atari. It has about four or five chips and it decodes the Apple weirdo-format disk and lets the Atari read it directly.

AE: Will that, then, be the end of the copy protection problem? You will buy a piece of Mac software, and it will run?
DS: Well, that will depend on how badly the author or publisher wants to protect the program. Naturally, if a program tries to modify the way the drive reads the disk, a Mac disk drive will respond to that, whereas our hardware-controlled drive won't. But most of the copy-protection is much simpler than that.

AE: What about laser printer support?
DS: I haven't been able to get my hands on an Apple LaserWriter printer to try it, but it seems that if we plug it in through serial, it should work. At least I can give you lots of reasons why it should – none of which is as good as testing it, but it should work. If it doesn't, it sure will soon. The laser printer aspect is very important – that and the disk drive.

AE: Do you have any advice for people who have bought the Sac?
DS: Well, for one thing, everybody should look for our hidden dedication page. One of the people we've dedicated it to is Bill the Cat, from Bloom County. Just hunt around the sign-in page with the mouse – we have an invisible button there. The other thing you'll find is that when you crash the machine, you come up to a crash page. The undocumented way to restart from a crash is to hit the table with your hand. That joggles the mouse a little bit, and that's what the software looks for prior to doing a re-start. ■

The Magic Sac

Macintosh Emulation on the ST? Some said, "Why bother?" David Small said, "Why not?"

"Who will write the ST/Macintosh interface? Talk about the pot of gold at the end of the rainbow! If you go out and learn about the Mac and the ST, and 68000 assembler, you can do it. (I just may myself; I always wanted to retire by age 30.) The advantages of taking that year of Mac software development and making those programs available to the ST are pretty clear. Someone is going to do it, and clean up!"

– David Small, writing in Outpost Atari Creative Computing, July 1985

David Small turns 30 this year, and he isn't a millionaire—not yet, anyway. But he has made a start. In October of 1985, Small accepted his own challenge, working solo to develop a device and software system that would let the ST run Apple Macintosh software. The technical problems proved tractable, and Small's company, Data Pacific, Inc., started marketing the Magic Sac Macintosh emulator in mid-1986.

Other practical difficulties may, over the long term, prove more daunting: the Magic Sac requires its user to obtain and install a pair of ROM chips containing Apple's proprietary code for the Macintosh OS. Whether this task requires too much of the casual user's computer savvy is open to question, as is the issue of whether Apple will permit these chips to remain widely available. Moreover, the Magic Sac works only with the ST monochrome monitor, an option many users have foregone in favor of color systems. These limitations may ultimately constrain the potential market for the Magic Sac. Meanwhile, says Small, the device appears to be selling fairly well.

What's in the Sac?

For $129.95, you get (as the name implies) a brown paper bag containing the Magic Sac cartridge itself, one Atari ST disk, an Apple Macintosh disk, a cable to connect your ST to a Mac, and a manual. For $149.95, you get the Magic Sac Plus, which includes all of the above, plus a battery-backed clock that functions in both Mac and ST modes. The Plus version is marketed through dealers and mail-order distributors; to obtain the basic Sac, you must buy direct from Data Pacific (609 E. Speer Blvd., Denver, CO 80203, (303) 733-8158).

By itself, this conglomeration of hardware and software isn't enough to run Mac software. You also need to obtain two "Apple 64K Boot ROMs" (Apple part numbers 342-0220-A or B and 342-0221-A or B) containing the Macintosh operating system, graphics toolbox, and other code for which Apple holds the copyright.

Getting these chips—either direct from an Apple dealer or via mail-order from an electronics surplus house—is not difficult at present, though Apple could conceivably attempt to curtail their availability should the Magic Sac become an important issue in competition between the Mac and the ST. If you own a Macintosh, the Data Pacific manual half-jokingly suggests removing its ROMs and putting them in the Sac (not a very practical notion, because the Sac requires access to a working Macintosh for use as a front-end system in obtaining software.)

Once you have cadged the ROMs, installing them is fairly simple—you just open up the Sac cartridge, press the ROM chips into sockets provided for them on the circuit board, close up the device, plug it in your ST cartridge port, and you're off. If you make a mistake, the Sac software will tell you—a nice touch. Now, you're ready to run some Mac software.

Well, not quite—the next step is to obtain some Macintosh software to run. Because the ST disk drives can't read Macintosh format disks, you must first find a Macintosh.

If you already own one (and haven't removed its ROMs for installation in the Sac) you are in great shape (of course, if you own a Mac, why would you want to run Mac software on your ST?). If you don't own a Mac, you will have to be a little more resourceful—a few calls to local user groups and a little pleading will probably get you what you need. Your benefactors may smirk a little, but you'll have the last laugh yet!

Now go to your Apple dealer and buy some Macintosh software, or presume further upon the generosity of your newfound Apple friends and borrow some disks of public-domain Mac software. Make sure the material isn't copy-protected, as this will defeat the software used to transfer programs from the Mac to the ST.

Next, boot your ST with the Sac distribution disk, and format some blank

By ADAM STEPHENSON

disks in Magic Format to receive the software you are about to transfer. Magic Format disks contain about 400K (no provision is yet made for using the greater capacity of ST double-sided drives) and cannot be read by the ST in its native mode. In addition to the Magic format utility, the Sae disk contains programs for copying and archiving Magic Format disks, as well as two programs to facilitate use of the battery-backed clock built into the Magic Sae Plus.

Set up your ST and your begged or borrowed Macintosh, side-by-side, and use the cable supplied with the Sae to connect the serial ports of the two machines. Now, run a program called RECEIVE.TOS on the ST and its companion, TRANSMIT 1.0, on the Mac. Once communication is established, a Mac disk can be transferred to a Magic Format disk on the ST in about 11 minutes.

Now You're Ready to Mac

To engage the Magic Sae, you open the file MAGIC.PRG on the ST distribution disk. In a few seconds, a dialogue box comes up, asking you to indicate what size Mac you want your ST to emulate: 128K (original Mac), 256k (Midi-Mac), 512K (Fat Mac), 512K plus RAMdisk (Fat'n'Fast Mac), or 896K (Obese, but not quite a Mac Plus). The latter three options are available only if you have a 1040ST.

You must also specify which of the ST output ports, RS-232 or parallel, you want used for printing. The kind of output you will get depends on the kind of printer you have hooked up, the kind of printer drivers you have installed, and the kind of software you are using. Theoretically, it is possible to hook up an Apple ImageWriter or even LaserWriter printer via appropriately customized cabling and achieve from it the same results as if they were hooked up to a Macintosh. Users of Atari SMM804/Epson-type printers should note that the Sae currently makes no provision for obtaining ImageWriter-type graphics from this type of output device.

After setting your options, you engage the cartridge by clicking on the MAGIC box, at which point the system tells you to INSERT A MAGIC FORMAT DISK. At this point, you really are on your way. Honest.

Assuming there is a Magic Sae compatible copy of the Macintosh Finder (the Mac equivalent to the GEM desktop) on your disk (the Sae supports

Theoretically, it is possible to hook up an Apple ImageWriter or even LaserWriter printer.

Finder versions 1.0 to 4.1, with the exception of 3.2) your next stop should be the Macintosh desktop.

The only major differences between working with the Magic cartridge and with a real Mac involve the keyboard and the disk drives. The Macintosh keyboard contains a cloverleaf symbol key and an Option key that don't exist on the ST; the Sae substitutes the ST Control and Alternate keys for these special Mac keys. An easy way to see which key is which is to use the Keyeaps desk accessory included on the Mac system disk.

The disk drive problem is a bit sticky. Unlike the more straightforward ST, the Macintosh is a virtual memory machine and spends a lot of time and energy talking to its disk drives. To prevent users from removing magnetic media before the system is ready to relinquish it, the Mac disk drives have no ejeet buttons. Instead, disk-ejections are normally performed by software, with heavy prompting. Because the ST disk drives are subjeet to no such limitations, you must be eareful to ejeet your Magic Format disks only when the system prompts you to do so. To do otherwise is to risk losing data. Aside from this small hardware problem, the Magic Sae is successful in forcing the ST disks to behave in the expected Mac fashion.

In most other respects, performance of the ST under the Magic Sae meets or exceeds the performance you would expeet from a Macintosh. Speed of program execution is about 20% faster on the ST, due to the faster clock speed of its processor.

The ST monochrome screen is actually a little larger than the Mae screen in terms of pixels across and down, and some subtle trickery permits "correetly written" Macintosh software to take advantage of this extra size. Most programs, however, execute only in the upper left-hand corner of the ST screen, in the portion subtended by the Mac's absolute display boundaries.

The Magic Sae mouse pointer seems to move a little more smoothly than the Macintosh's own, probably, once again, due to the higher clock speed and resultant higher sampling rate of the ST.

Not all non-copy-protected Mac software will run successfully on the Magic Sae. Generally, if developers have made an effort to adhere to Apple's guidelines, the program will work on the ST under emulation. If a program tries to access the Mac hardware directly, however, it won't work -the Mac hardware is not emulated by the Magic Sae.

The ST distribution disk that comes with the Sae contains a list of around 100 software packages that have been found to work, and some that don't. The list of functional software packages is fairly impressive. Included are *MacDraft 1.2*, *MacWrite 2.2*, *Microsoft Excel*, *ReadySetGo*, *Overview*, *Macpaint 1.5*, *1st Base*, *Switcher 5.0*, *BPI Accounting*, and many others. Some favorites don't work yet: *Gato*, *MacGolf*, *Balance of Power*, *Star Trek*, *Lotus Jazz*, *Full Paint*, and *Red Ryder* to name a few. But Small and company are finding and fixing bugs as fast as they can, and by the time you read this, some of these programs will surely have moved to the "OK" list.

By the time you read this, version 4.0 of the Magic Sae should be available. Promised improvements include Epson printer support, limited color monitor support, a better RAMdisk, double-sided disk support, hard drive support, possibly some sound, and maybe even access to a built-in debugger.

In coming months, Small intends to release a hardware interface that will permit the ST disk drives to read Macintosh format disks directly, eliminating the rather nasty problem of having to find a Mae for software transfers. This enhancement should also permit the Sae to run most copy-protected Mac programs.

Conclusions

Should you buy a Magic Sae? Not if you aren't a fairly patient and sophisticated ST user willing to put up with its limitations. In its present release, the Magic Sae must be considered an unfinished product, requiring a lot of revision and testing before it is easy enough for the dilettante to use and reliable enough to be trusted with serious applications.

On the other hand, the Magic Sae is an extremely interesting hack, is fairly affordable, and can be said to enhance the potential utility of the ST for those willing to tolerate its quirks and become familiar with the Macintosh idiom. ■

Software Survey

These short reviews will bring you up to date on some of the newest software available for both 8-bit and ST systems.

Set in medieval times, *Wizard's Crown* sends you and your 8-bit Atari Home Computer on a quest for the treasured Crown of the Emperor. You and your band of explorers, weapons at the ready, search a land inhabited by wanderers, criminals, and peasants. And what a search it is.

To begin the game, you must take three blank disks and set them up as your game disks—a lengthy process, to say the least. Then, housekeeping out of the way, you are off to the local inn to begin your adventure and enjoy the flexibility of some very professional programming.

While the contest requires you to create a band of adventurers, beginners can choose to use a group provided on the game disk. When you become more familiar with the game, you can put together a team of your own.

Predictably, in the course of your quest you meet characters who want to do you harm. The weapons at your disposal—mauls, daggers, swords—differ in their efficacy, and your success in battle is also affected by the direction

Ballyhoo

PLAYABILITY

CHALLENGE

ADDICTIVENESS

EASE OF LEARNING

System: 48K Atari 8-Bit Home Computer
Price: $34.95
Summary: An intricate text adventure set at the circus
Manufacturer:
Infocom
125 Cambridge Park Dr.
Cambridge, MA 02140
(617) 576-3190

A Mercedes Benz and a bicycle. Both move you from place to place, but they do so with radically different style. Text adventures, too, move you from place to place, and they also do so with different degrees of style.

Experienced adventurers will affirm that Infocom has become the Mercedes Benz of text adventures—the standard by which others are measured—and the new *Ballyhoo* is no exception.

Taking you behind the scenes of Tomas Munrab's big-time circus, *Ballyhoo* asks you to find the kidnapper of the owner's daughter.

As you scratch and scrounge for clues, you face a multitude of obstacles, including puzzles, dangerous animals, and off-center carny workers. Oh, the people you meet!

Infocom, as always, has provided a vivid framework for you to traipse through. The descriptions of your surroundings will soon have you recalling the sights and sounds of circusses in your past.

Although this is a text adventure, you never lack reminders of what is going on around you. When a monkey hops on your back, for example, you are kept well informed about his activities.

Like other Infocom games, *Ballyhoo* comes with a package of supplementary material, which you would be well advised to study. Certain bits of information are available only to those who familiarize themselves with these props, and even those things that don't affect the story make the game more fun; a balloon, a ticket, a souvenir program—all give the game a certain immediacy and make you believe you are there.

Other trademarks of Infocom—lively prose, clever wit, challenging mazes, and the ability to succeed with different strategies—combine with the local color to create a game that will keep you occupied for hours—and hours. *Ballyhoo* is yet another success from Infocom.—***Andy Eddy***

Wizard's Crown

PLAYABILITY

CHALLENGE

ADDICTIVENESS

EASE OF LEARNING

System: 48K Atari 8-bit Home Computer
Price: $39.95
Summary: Challenging medieval role-playing contest
Manufacturer:
Strategic Simulations
1046 Rengstorff Ave.
Mountain View, CA
94043
(415) 964-1353

your adversary is facing and whether he is standing or lying down.

In combat, as in the creation of your cohort, you can take a shortcut. Rather than engage in a blow-by-blow strategy session each time you encounter some wandering thugs, you can choose the "quick combat" option and have the computer resolve the confrontation. While this form of battle lacks the excitement and variety of standard combat, it does offer quick results and allows you to work your way into the gameplay instead of suffering demise after frustrating demise.

SSI has crammed a great deal of play value into *Wizard's Crown*, and if you spend the estimated 50 to 100 hours completing the quest, you will undoubtedly feel you have gotten your money's worth.—*Andy Eddy*

Mercenary: Escape From Targ

PLAYABILITY

CHALLENGE

ADDICTIVENESS

EASE OF LEARNING

System: 48K Atari 8-bit Home Computer
Price: $29.95
Summary: Vector graphics add appeal to this space adventure
Manufacturer:
Datasoft/IntelliCreations
19808 Nordhoff Pl.
Chatsworth, CA 91311
(818) 886-5922

Among the latest game releases for Atari 8-bit Home Computers is *Mercenary: Escape From Targ*, an arcade-like adventure from Datasoft that features sharp vector graphics similar to those that made the coin-op Battlezone a favorite among arcaders.

The object of the game is to find all the items necessary to leave Targ and escape from the warring factions. To earn the money and materials for your escape, however, you must befriend the local residents by working as a mercenary.

You can cruise the surface of the planet in one of the many craft you come across during the game; the real challenge is to find the intergalactic ship that will take you into outer space.

As you search, you find landmarks belonging to the battling powers; these range from bridges and buildings to decorative monuments like "Vectorhenge," a futuristic version of Stonehenge. You can destroy the structures you encounter with a single blast of your ship's guns, and when you do, you are rewarded with a stunning visual display as walls fold in on themselves and peaks topple. There are even some humorous touches—like the Commodore logo/monument which, when destroyed, earns a commendation in your text window.

The text window provides information about the objects you pick up and displays messages from the leaders of the opposing sides.

Datasoft claims that there are three different ways to escape from Targ, but you will find that discovering even one will require a great deal of experimentation.

For those who become addicted to *Mercenary*, Datasoft has released a sequel disk called *Mercenary: The Second City*, which sells for $14.95 and should add even more hours of challenging fun to the original game.—*Andy Eddy*

Temple of Apshai Trilogy

PLAYABILITY

CHALLENGE

ADDICTIVENESS

EASE OF LEARNING

System: Atari ST
Price: $29.95-$39.95
Summary: Comfy adaptation of an old favorite
Manufacturer:
Epyx
600 Galveston Dr.
Redwood City, CA
94063
(415) 366-0606

Long-time adventure gamers will be happy to learn that Epyx has released its classic *Temple of Apshai Trilogy* for the Atari ST.

The new trilogy, which includes the games Temple of Apshai, Upper Reaches of Apshai, and Curse of Ra, takes advantage of the GEM operating system, allowing you to manipulate your character onscreen with the mouse and choose your response from a pull-down menu. Clicking on a highlighted action—shooting an arrow, using a potion, searching a room—puts your character into motion much faster than typing the command, so you have more time to enjoy the game. If, however, you prefer keyboard entry, you can use the available one-stroke commands.

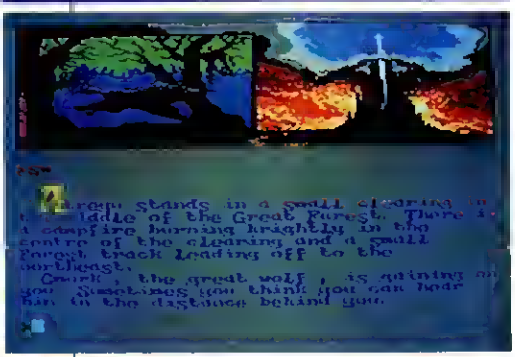
The game takes you through many phases of play, from creating a character and buying necessities to warding off monsters and pursuing treasure. The 568 rooms and 12 levels of play (four for each game) make the game very difficult to complete without some sort of fatal maneuver. But you can save your game on disk, so you can pick up where you left off if you expire.

When you do die, you may well be "saved" by one of the denizens of the dungeon, but depending on who finds you, a price may be exacted for the service; in the worst case, you could find yourself wandering the halls bereft of armor, weapons, and money.

The manual is an entertaining and informative adjunct to the fine design of the graphics and gameplay. The prose sets the mood for the game and gives you a taste of the atmosphere in the dungeon. Descriptions of the rooms, the treasures, and the creatures you will encounter are included, but there is still plenty to discover on your own.

I find that the computer games to which I return most often are those that provide an environment that stirs my imagination and makes me feel part of the action. *Temple of Apshai* does this for me; it holds in its medieval grasp the key to successful and enjoyable adventure gaming.—***Andy Eddy***

The NeverEnding Story



PLAYABILITY

CHALLENGE

ADDICTIVENESS

EASE OF LEARNING

System: 64K Atari 8-bit Home Computer
Price: $29.95
Summary: Lightweight adventure game/adaptation
Manufacturer:
Datasoft/Intellicreations
19808 Nordhoff Pl.
Chatsworth, CA 91311
(818) 886-5922

Where novels once spawned movies, they now beget computer games. Based on the 1983 book (and subsequent movie) of the same name, *The NeverEnding Story* takes place in Fantasia, a shining land reminiscent of Oz.

Fantasia is being consumed by a force called The Nothing, and as the warrior Atreyu, you must save the land. To further complicate things, an Earth kid named Bastion is reading *The NeverEnding Story* at the same time, but doesn't realize that his reading will draw him into the tale.

This adventure appears to be designed for the younger set—those who were attracted to the original story. Which is not to say that adults can't enjoy it, but the game is very basic as adventures go and can be completed quickly by an experienced player.

The NeverEnding Story is laid out as a text adventure with a picture linked to each location. Unlike other graphic adventures, however, these scenes don't really help you in your quest. They are more like a storyboard that makes playing the game remind you of reading an illustrated book.

The text that accompanies the pictures is only slightly more helpful. I found the text difficult to read at first, because the resolution of the 8-bit computer screen is inadequate to support the flowing script-like character set used throughout.

There are very few objects to pick up on each of the three levels, and most of them bring you closer to your objective. The most difficult part of the game is getting through the maze on each level; as in other adventures, making a map diminishes the number of unnecessary moves your character has to make.

The most attractive feature of the game is that children can join forces with their parents to play it, and you can save your game to disk when younger players' attentions wander.

While knowing the story—through either reading the book or watching the movie—won't ruin the game for you, it will help you cut down the amount of time needed to discover the traits of certain characters.

If you have kids, *The NeverEnding Story* will be a great addition to your software library. For yourself, unless you are a rank beginner, you will probably be happier spending your $29.95 elsewhere.—***Andy Eddy***.

Starglider

PLAYABILITY

ADDICTIVENESS

CHALLENGE

EASE OF LEARNING

System: Atari ST
Price: $44.95
Summary: Excellent space action/combat/flight simulation game.
Manufacturer: Firebird Licensees
P.O. Box 49
Ramsey, NJ 07446
(201) 444-5700.

A world inside a computer—it's not really possible yet, and may never be, but today's cleverest programmers can cram information into memory banks and present it to us as an utterly convincing simulation of an actual or imagined universe. *Starglider* is British programmer Jeremy San's fantastic but credible version of a possible future reality.

Your home planet, Novenia, is under attack by a group of bad apples under the leadership of one Hermann Krudd. His fleet has bypassed the outer defenses of the planet by disguising its ships as Stargliders, large birds (treasured by the Novenians) that migrate into outer space, then return to mate. Once Krudd's fleet of Trojan Stargliders achieves Novenia's atmosphere, it releases a vast invasion force which practically obliterates every recognizable feature of the planet.

Just as it seems all hope is lost, you discover the world's last AGAV (Airborne Ground Attack Vehicle). Incredibly, this swift little fighter, armed with lasers and missiles, and your agility and cunning are the only things necessary to knock out the overpowering enemy force.

The exquisitely maneuverable AGAV can shoot through the atmosphere at breathtaking speed or hover in one spot. Its equipment includes Plasma Drive, a Molecular Neutralizing Force Shield, and a computer system with synthetic voice output. The remote-controlled Television Reconnaissance System lets you get a close risk-free look at your immediate surroundings by sending out a guided missile equipped with a video camera.

Yes, *Starglider* is a shoot-'em-up game, but that's about all it has in common with such venerable ancestors as *Space Invaders*. Jeremy San's implementation of the classic concept is superb. This is *Super Realistic Ultra Space Invaders* in full color with real-time 3-D point-of-view graphics.

As you play, you will find yourself ducking to avoid the various enemy ships, lasers, and missiles that hurtle toward your viewscreen, and there is no mistaking the visceral feeling of satisfaction you derive from watching enemy ships explode into shrapnel at the jab of your lasers.

There is more than just shooting to *Starglider*, however. When your laser or shield power drops below a certain level, you must carefully fly into one of the slowly rotating silo entrances on the surface of the planet for maintenance. There you can also query the computer system about the various forms of enemy craft.

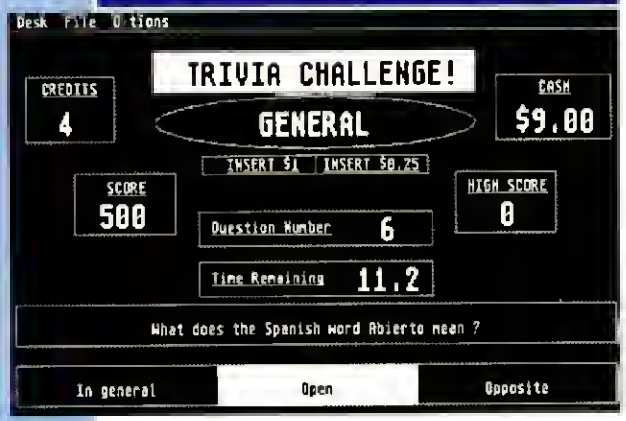
No software is perfect, but the only two flaws I found in *Starglider* are minor and detract little from the game. The first is that although a list of the ten highest scores is maintained for each play session, the information is never stored to disk, so there is no permanent record. The other flaw is that the game always begins in exactly the same way; there is no randomized scattering of enemy forces.

The rest of the good news is that the game works fine with a monochrome monitor.

So, are you qualified to fly the AGAV? All it requires is a little nerve, some agility, and a few bucks for the disk. If you are an ST owner who enjoys action-oriented computer games, don't miss *Starglider*.—***David Duberman***

"Now that I finally made it to 'Star Commander' in Star Raiders, life just doesn't seem to have any meaning."

Trivia Challenge



PLAYABILITY

ADDICTIVENESS

CHALLENGE

EASE OF LEARNING

System: Atari ST
Price: $39.95
Summary: Challenging game for serious trivia buffs.
Manufacturer:
MichTron Inc.
576 S. Telegraph
Pontiac, MI 48053
(313) 334-5700

I love trivia. I like the idea of finally being rewarded for the many hours I spent in school absorbing facts that turned out to be of no consequence to anyone but the teacher who told us they would be on the next quiz.

So, when MichTron's new *Trivia Challenge* arrived at the office, I grabbed it—in the name of investigatory journalism, of course.

Trivia Challenge is a solitaire game. What makes it a game instead of a series of trivia questions is the challenge to earn hypothetical money as you play. You start the game with $10.00, and you must part with that stake in $1.00 or $.25 increments to play. If you score over 1000 points in a single round, you begin to replenish your bank account.

When a question appears on the screen, you have several seconds in which to read it. Then three answers appear below, the timer starts, and you must click on the correct response before time runs out. The faster you choose the correct answer, the more points you score. Play continues until you miss two questions, at which time you can begin a new round—if you have any money left.

The questions are grouped into five categories. Sports covers sports on an international level; you don't have to know "Which Yankee pitcher . . . ," but you might have to know something about the origins of Cricket.

Art includes questions on painting, sculpture, music, literature, theatre, and decorative arts. Pop music covers the last few decades, from Bing Crosby to Madonna, from Jimi Hendrix to Chris de Burgh.

Science was my favorite category, with questions on chemistry, physics, biology, botany, astronomy, inventions, natural history, medicine, mathematics, psychology, and archaeology.

The specialized categories are all quite challenging, and it is comforting to know that just before your money runs out, you can switch to General Knowledge and stand a decent chance of recouping your losses.

There is also provision for adding your own questions, using a text editor or word processor.

Trivia Challenge is fun. The questions are difficult and varied enough to be challenging, and there seem to be enough of them to keep you going for quite a while: I played for several hours before I began to notice repeated questions.

The choice of questions and some of the spellings used reveal the British roots of the program. This can occasionally trip you up, but really doesn't present any hindrance to your enjoyment of the program.

What does detract somewhat from the program is the inordinate number of misspellings found throughout the game. When presented with answer options like "Bette Davies," "tam o shanker," and "Eddison," you are forced to wonder whether the author is trying to trick you. I eventually came to the conclusion that the author was careless rather than devious, but a few hours of proofreading would have gone a long way toward increasing my enjoyment of the game.

Overall, however, I liked the game very much. No namby-pamby kid's game, *Trivia Challenge* will provide hours of satisfying play for the person whose head is filled with random bits of information in search of a quiz.—***Betsy Staples***

Try This

Continued from page 27.

Reader Challenge

We have presented here a routine to do extended precision multiplication. Our challenge to you is to write a routine to do extended precision addition. To make the challenge more interesting, the routine should be employed in a program to calculate palindromes using the repetitive addition conjecture.

To refresh your memory, a palindrome is a number that reads the same backward as it does forward, for example, 22, 484, 2332, and 1356531. The repetitive addition conjecture requires that you begin with any positive integer. If it is not a palindrome, reverse its digits and add the two numbers. If the sum is not a palindrome, treat it as the original number and continue. The process stops when a palindrome is obtained. For example, here is the process beginning with 78:

```
   78
+  87
  165
+ 561
  726
+ 627
 1353
+3531
 4884
```

The conjecture, often assumed true, is that this process will always lead to a palindrome. And indeed, that is what usually happens. Most numbers less than 10,000 will produce a palindrome in fewer than 24 additions. But there is a real thorn in the side of this conjecture—the number 196. No one really knows whether a palindrome will be produced if the beginning number is 196. After 100 repetitive additions, the result appears to be almost palindromic, but "almost" doesn't count in precise mathematics.

You can, of course, experiment with 196 as a starting value, but you should test your program with starting values of 89 and 6999. Hint: 89 produces a 13-digit palindrome after 24 additions and 6999 produces a 14-digit palindrome after 20 additions.

Next issue: more about palindromes and our extended precision program to test the repetitive addition conjecture.

Thunder!

More than a spelling checker, this program for the ST can correct your typos and calculate the Fog Index of your writing

As a multifaceted writing tool, *Thunder* offers Atari 520 and 1040ST users a powerful spelling checker that may even help them improve their writing style. The large memory capacity of the ST allows the main dictionary to be loaded into memory to provide instantaneous reaction to your typographical errors.

The program can be used either independently to check your documents after they have been created or as a desk accessory. In the latter mode, it looks over your shoulder as you type and notifies you with a beep if it doesn't recognize a word. If you find the beeping annoying (as I did) you can either turn the feature off or run the stand-alone spelling checker when the document is completed.

If, on the other hand, your hearing is impaired and you can't hear the beep, Batteries Included will exchange your disk for a special version that flashes the screen instead of beeping to bring an error to your attention. This is the only such special version of a software package that I know of, and I think Batteries should be applauded for this move to make computers useful and accessible to more people.

Dictionaries

You can add a limited number of words to the main dictionary, or you can create a supplemental dictionary of words that pertain to your area of expertise—handy for technical writers and others who work with specialized but frequently-used terms. You must bear in mind, however, that words added to the main dictionary cannot be deleted because of the special process Batteries Included uses to enable the word to be saved in a very small chunk of memory. (The entire 50,000-word dictionary occupies only 88K of memory.)

System: Atari ST **Price:** $39.95
Summary: Versatile spelling checker/ document analyzer.
Manufacturer:
Batteries Included
30 Mural St.
Richmond Hill, ON L4B 1B5
(416) 881-9816

You can also create a "learn" dictionary that allows you to call up entire words or phrases simply by typing an abbreviation or code of your own. For example, in writing this review, all I have to do to call the words "Batteries Included" to my ST screen is to type the letters "BI." The learn feature can also be used to correct automatically the typing errors that you make most often. I, for example, frequently type "hte" instead of "the," so I have "taught" *Thunder* to correct the error each time I make it.

Running *Thunder* automatically accesses the learn dictionary and makes all the pertinent corrections and expansions. You can even create multiple learn and supplemental dictionaries for different uses or users.

Using Thunder

When *Thunder* finds a word it doesn't recognize, it highlights the word and displays a list of similarly spelled words. All you have to do to change the word is click on the proper spelling. If you know your word is correct, you can use the mouse to move on, ignore repeat occurrences of the word, or add the word to the main or a supplemental dictionary.

You can also test an isolated word by typing it and clicking on the TEST box.

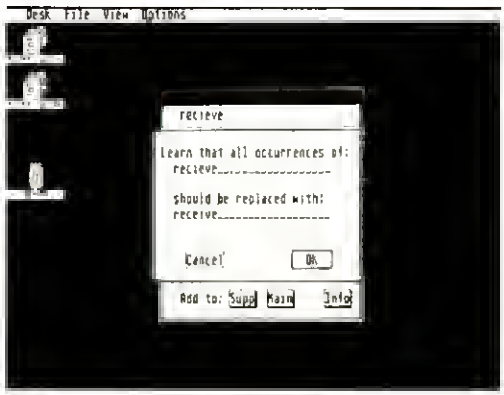
All these options are contained in a single dialog box to minimize the hopping around required by some utilities.

Analyze Your Work

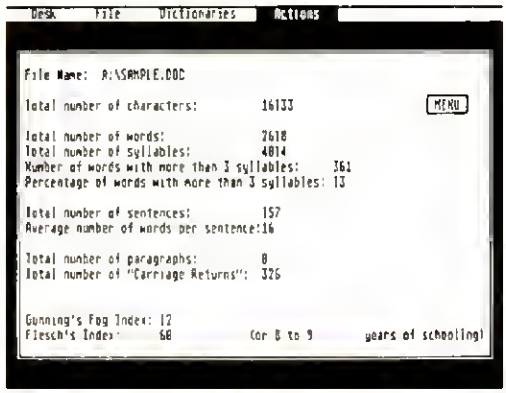
Thunder can also perform various calculations that enable you to analyze your written work. It can quickly calculate approximate word, sentence, and paragraph counts and tell you the number and percentage of words of three or more syllables in your document. This information can then be used by you or the program to estimate the approximate grade level (or Fog Index) of your writing.

In addition to running checks in the stand-alone mode from your disk drive, *Thunder* allows you to analyze files on a hard disk or RAMdisk to save a bit of time. But no matter what storage medium you use, you will find *Thunder* speedy and helpful.

You can choose to have *Thunder* load immediately upon boot-up, and you can choose which dictionaries to load. Another very useful feature is the one that allows you to ignore certain combinations of letters, such as those that start with capital letters. This lets the program pass over proper names, which most certainly are not included in the dictionary.



The Learn feature teaches Thunder to correct a spelling mistake.



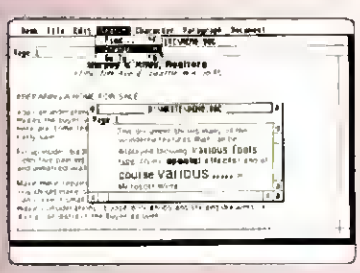
The Find Statistics command produces a page of information about your document.

On the negative side, I found *Thunder*'s inability to recognize contractions frustrating. It interprets the apostrophe as a delimiter and breaks the contraction into two words, flagging the whole thing as a misspelling, so you must continually click the IGNORE REPEATS box.

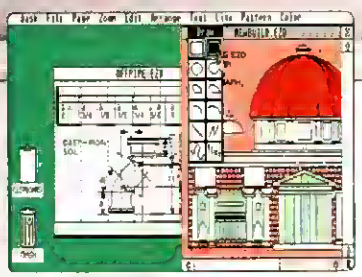
This inconvenience is slight, however, and pales alongside the strength of the program as a writing utility. *Thunder* offers sufficiently sophisticated features to make it a worthwhile buy for the professional—at any price—but is so inexpensive that any ST user can afford to have it on hand to improve his writing.

Note to current owners of *Thunder*: If you have version 1.3 or lower, you can return your disk to Batteries Included for a free upgrade. ■

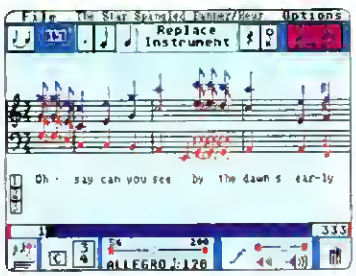
By ANDY EDDY



Word Processing



Graphics & Design



Music Composition

The ST features familiar icons, spectacular graphics, mouse control windows, drop-down menus and on-screen directions for ease of use.

The ST transfers data at 1.33 megabytes per second. Which means it could transfer the entire works of Shakespeare in less time than it takes to read this ad.

The ST keyboard is identical to that of standard data terminals, so it's already familiar.

Introducing technology

Finally, there's a personal computer that not only solves problems like other computers, but also solves the one problem other computers created. Affordability.

Introducing the ST™ Computers from Atari: The 520ST™ with a 512K memory and the 1040ST™ with a full megabyte. The ST was designed utilizing the most recent breakthroughs in semiconductor technology, producing a PC that does more tasks with fewer parts.

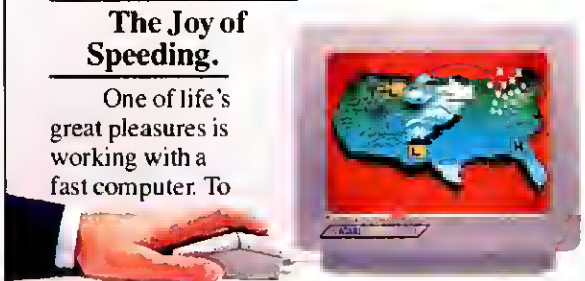
Which means it costs less to make. And less to buy.

The Joy of Speeding.

One of life's great pleasures is working with a fast computer. To bring the ST up to speed, Atari starts with the Motorola 68000 chip—the same "brain" you'll find in the Macintosh.™ Then, Atari adds the extra oomph of four exclusive chips—specially designed to handle several functions simultaneously. (Other PCs limp along handling one function at a time).

This results in making the ST much faster in the computing process. Faster in moving data within the system. Faster in getting information to the screen.

So now, you can run programs like word processing, database management, and financial planning with more zip and efficiency than ever before. A nice feeling.



Compare Our Components.

A computer is only the sum of its components. So we made each one better. Look at the layout of the ST keyboard, for example. You get a full numeric keypad. Plus a cursor control keypad with editing keys. Plus 10 programmable function keys. Now add the mouse and consider the options.

The monochrome monitor is a beauty. Taking its broad bandwidth signal from the ST's exclusive video chip, it displays a resolution of 640 × 400 pixels. This gives you razor-sharp, jitter-free text display for word processing and CAD work (very easy on the eyes). Or, for stunning color images, add the RGB color

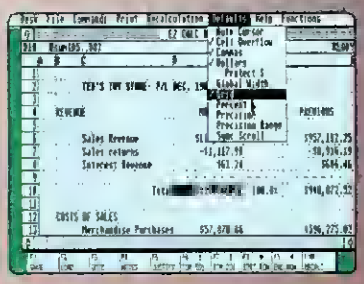
The ST includes a three-voice sound chip with a range from 30 to beyond 20,000 Hertz. The Amiga™ and Macintosh are limited to a maximum of 7,000 Hertz.

The ST works with a wide range of IBM® compatible printers. Including laser printers and plotters.

The easy-to-read manual will have you working on your ST in minutes.

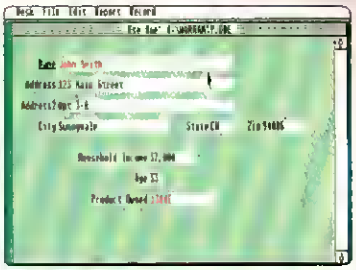
You can use command keys, or a mouse. It's your choice.

The 3-1/2 inch encased disk is more durable and easier to work with than the standard 5-1/4 inch floppy.



Spreadsheets

Entertainment



Database Management

so advanced, it's affordable.

monitor. No interface board needed. Just plug it in. (Try doing that with a Mac!)

You get an external disk drive with the 520ST. An internal, double-sided disk drive with the 1040ST. Both have a disk speed many times faster than previous PCs. And they're blissfully quiet.

Plus, many of the costly peripherals you have to add on with other PCs are already built into an ST. Like the built-in MIDI (musical synthesizer interface) port. And the industry-standard printer port and modem port. And for even more memory, a port for the SH204™ hard disk drive, with twenty megabytes of storage and the fastest transfer rate in the industry.

With hundreds of software programs already available, an ST can grow with your imagination, or your business. Companies like Microsoft,® Spinnaker,® Activision® and more are continually making contributions to the ST software library. And some popular programs originally designed for other computers are actually being upgraded to take full advantage of the ST's capabilities!

The Price of Power.

Best of all, the cost of an ST is so low, it may come as something of a shock. The 520ST sells for under $800, including monochrome monitor.* The 1040ST, with a full megabyte of memory, for under $1,000. That's less than one dollar a Kbyte.

So now, you don't have to be rich to be powerful.

To see why Infoworld called the ST "The best hardware value of the year" check it out at your Atari dealer. For the one nearest you, call 1 800 443 8020. 9AM-5PM Mon.-Fri., Pacific Time.

*RGB color monitor, $200 additional.

THE ST™ COMPUTERS from ATARI®

An introduction to statistical baseball simulations

Armchair Managing, Atari Style

By ARNIE KATZ and BILL KUNKEL

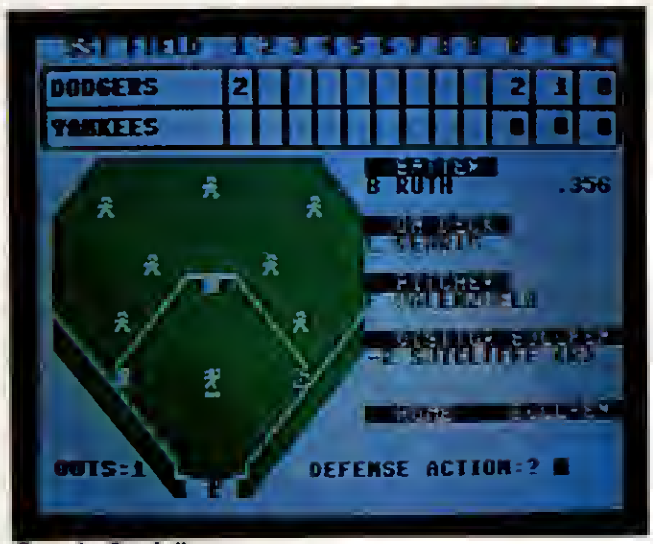
For months now—ever since the end of the 1986 World Series—sports fans all over the country have debated the wisdom of the decisions made by managers Davey Johnson of the Mets and John McNamara of the Red Sox. Every lover of our national pastime knows that he has the inalienable right to second-guess the pros.

Most fans spend the winter bragging about the brilliance with which they would have handled the strategic challenges faced by their favorite teams during the season past. Walter Mitty fantasies may dominate the "Hot Stove League," but some fans do put their egos on the line; they take command of a major league baseball team in a statistical sports simulation.

These games, which first gained popularity in the 1950's, use complex mathematical formulas to create a statistical model of baseball. The designer of a sports simulation quantifies all the factors that determine the outcome of each play and establishes their relative importance.

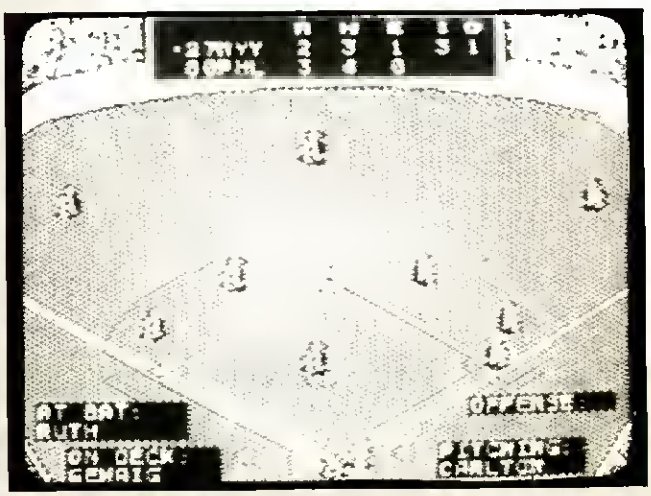
Let's look at a single play and see how a statistically based game would handle it. First, the program decides if the batter will hit safely or make an out. If the batter is to be out, the program next determines whether it will be a strikeout, a ground out, or a fly out, and which defender will have to make the play.

The probability of a strikeout depends partially on the number of strike-



Computer Baseball

The World's Greatest Baseball Game


Micro League Baseball

outs-per-nine-innings compiled by the pitcher. Fielding is significant on a bouncer or a pop-up.

If the result is to be a safety, the computer determines if it is a hit or a walk. The hurler's walks-per-nine-innings affects this. Finally, if the batter actually hits the ball, his frequency of extra-base hits comes into play.

Each of the athletes in a statistical baseball simulation displays the same skills as his real-life counterpart. A hitter who blasts 40 home runs in 600 at bats in an actual major league season will collect about the same number of homers—adjusted for other differences, like the prowess of the pitchers—in an equal number of at bats in the simulation. This structure gives one or two armchair managers the chance to find out whether their brand of strategy can improve the team's performance. Most simulations also allow managers to trade or even dump all the players into a pool and create entirely new teams.

The first wave of statistical baseball games, typified by APBA Baseball, Strat-o-Matic, and Big League Manager, consisted of non-electronic board games. These games rely on dice or spinners to generate random numbers, which the managers then compare to the batters' formula on a card and a set of result charts. Non-electronic baseball contests are fun, but their mechanics are cumbersome; in a sense, they turn the managers into human computers who must crunch numbers and consult registers. Any attempt to make such a simulation more accurate by including additional elements inevitably involves making it harder to play. At least one baseball board game takes longer to play than the actual sport.

Computer statistical baseball simulations have been around only since 1981, but they are already replacing the non-electronic titles in popularity. Not only are they easier and quicker to play, but they shove the numbers into the background where they belong. It is common for experienced table sports gamers to "play the formulas" rather than evaluate strategic situations in light of the abilities of the athletes. This punctures the very illusion stat simulations strive to create—that the gamer has analogs of the actual players under his control.

The Games

The owner of an Atari 8-bit home computer can choose from several baseball games, each of which has advantages in certain situations. *Micro League Baseball* from Micro League Sports Association, *Computer Baseball* from Strategic Simulations, and *The World's Greatest Baseball Game* from Epyx are the three current titles.

***Walter Mitty** fantasies may dominate the "Hot Stove League," but some fans do put their egos on the line.*

The World's Greatest Baseball Game displays each result in full-screen animation. Although its statistical underpinning is the weakest of the three, the Epyx entry presents reasonably accurate representations of the major league players. Epyx issues annual update disks based on the previous major league season, but the selection of great teams of the past is very limited. *The World's Greatest Baseball Game* will best satisfy those who want to play an occasional game with the current major league teams.

Computer Baseball is the oldest program of its type for the Atari 8-bit systems. This is a mixed blessing. The utilitarian graphics do little more than remind the managers of the number of runners on base, but the publisher does provide a vast library of disks for separate purchase.

Each of these supplemental disks contains either a complete season or one of the great clubs of the past. *Computer Baseball* is best for a solitaire gamer who wants to play a full season with stock teams or handpicked squads or who wants to run a tournament of stars in which he can match top teams from different eras.

Micro League Baseball is indisputably the best-looking of the three games. Its intricate animation and wide variety of visual results give this game maximum eye-appeal. The play mechanics, though simple to learn, give both managers something to do on every play. This makes *Micro League* ideal for any form of head-to-head play, including leagues and cooperative replays. A huge selection of additional teams is available, including collections of ten squads for each current major league franchise. Managers who want to trade players among teams or get printed box scores after each game must buy the extra disks that perform these tasks.

Play It Again, Atari

Even though any of the three programs described here can play a game in under 30 minutes, simulating an entire major league season is no small task. Many people do it with great pleasure, but it is easy to become bogged down when the cellar dwellers get together for five games in a row.

A one-team season replay is better for time-pressured computerists. Pilot your favorite team through its last schedule, and see if you can improve the won-lost percentage. Replaying the previous year's World Series can also provide several evenings of good fun.

Pursuing the Pennant

Leagues offer the ultimate in competition. Although *Micro League Baseball*, *Computer Baseball*, and *The World's Greatest Baseball Game* all have solitaire options, artificial intelligence in this instance is a poor substitute for human resourcefulness and insight.

Face-to-face leagues generally run more smoothly than postal ones and are easier to set up. MLSA is reportedly working on a telecomputing version of its game, but for now at least, in-person play is more fun.

In some leagues, each series is hosted by the owner of the home team, and the entire group gets together about once a month to discuss league events and negotiate trades. Playing all the games at the same site is worth some extra effort, because it results in a more closely knit league. A local computer store or library may even be willing to rent or donate the facilities. If the league can't find a place with enough machines, it isn't too hard to carry an Atari computer to the meeting place if necessary.

There is no ideal number of managers. Four is about the minimum, however, and few face-to-face computer baseball leagues survive with more than ten skippers. The publishers of the games can sometimes help would-be league founders find owners. Other good places to find participants are at your local computer store, on networks and BBSs, and through school and work bulletin boards. Game stores and baseball collectors shops, if you have one in your town, are other good sources.

Getting Organized

The format of a successful league should reflect the preferenees of its members. Do you want a one-year league or a continuing one that updates the teams with new data disks after each major league season? Will teams be made up of only contemporary players, only old timers, or some combination? Do you prefer actual teams or customized franchises? When league participants reach a concensus on these issues, the choice of format becomes much clearer.

Some of the more popular setups include:

- Stock Teams: Each owner selects one real-life franchise. The league may (or may not) mirror actual major league player deals.
- Hi-Lo: Each owner gets a pair of real major league teams, one good and one bad, which are combined to form a single league franchise.
- Draft: Managers pick their squads from a pool of players. The length of the season depends wholly on the participants' level of interest. Playing once a week, a 162-game season still provides a margin of safety against cancelled meetings. A monthly league might consider a 40- to 60-game schedule.

More About the Games

Micro League Baseball; $39.95
Micro League Sports Association
2201 Drummond Pl.
Newark, DE 19711
(302) 368-9990

World's Greatest Baseball Game; $34.95
Epyx
600 Galveston Dr.
Redwood City, CA 94063
(415) 366-0606

Computer Baseball; $14.95
Strategic Simulations
1045 N. Rengstorff Ave.
Mountain View, CA 94043
(415) 964-1353

Reading for Micro Managers

Most baseball fans, even the really avid ones, are familiar only with the players on their favorite teams. Computerized simulations turn partisan rooters into true baseball fans, because the road to the electronic pennant is paved with information.

Watching and listening to lots of baseball games is a must, but there are many books and magazines that provide statistics and analysis. The best are *Bill James Statistical Abstract* and *The Scouting Report*. These large format paperbacks appear early each spring and, together, offer an authoritative and detailed picture of our national pastime.

Statistical baseball simulations represent more than just another genre in computer gaming. They are the basis of an entire hobby. So if you are an armchair manager with 20/20 hindsight, don't miss this opportunity to leave the sidelines and really get into the game. ■

What Next?

After the new wears off, many personal computers wind up gathering dust in a closet. Don't let your Atari be one of them.

Why did you originally buy an Atari computer? To do word processing? To compose music? To manage your business? To play games? Chances are, whatever your initial reason for buying an Atari, you've discovered that it has many additional capabilities and potential applications.

The flip side of the coin is that you've probably experienced some frustration as well. Maybe your word processing package won't do subscripts or underlining. Perhaps your database won't sort on as many fields as you need. Or, it could be that when you write a program, your whole system acts user-hostile.

Depending upon the balance between your satisfaction and your frustration, you may continue to use your computer or set it aside. But there is a better way: **Atari Explorer** magazine.

As the premier magazine for Atari computer owners, it is our responsibility to make sure that you get the most out of your computer. To us, that means making sure that your Atari does more than you bought it to do, more than friends and associates' computers do, and, indeed, more than you ever imagined that a computer could do.

To make sure that you get the most out of your computer, **Atari Explorer** brings you objective, in-depth reviews of hardware and software; up-to-date information about new products; practical tutorials; stimulating columns; thought-provoking articles; and valuable inside information.

Hard-hitting Evaluations

At **Atari Explorer**, we obtain new peripherals and software packages as soon as they are released. We put them through their paces in our on-site laboratory and also in the environment for which they are intended: home, office, lab, or school.

Our evaluations are unbiased and accurate. We are not afraid to call a spade a spade or a lemon a lemon. Our first obligation is to you, our readers, and editorial excellence and integrity are our highest goals.

Practical and Stimulating

We know that some of our readers are beginners and others are experts. Thus, it is our responsibility to make what we publish both comprehensible to newcomers and interesting to veterans. That does not necessarily mean that the material is simple; we know you like to be challenged. What it does mean is that we provide the inexperienced user with every possible means to seize the subject matter and make it his own.

However, we don't want the experts to be bored, so although articles are accessible to beginners, they are theoretically non-trivial, cover topics in depth, and present information on more than one level.

At **Atari Explorer**, we are intensely interested in all aspects of computing. Ours is the magazine of pragmatic applications, communicative graphics, stunning animation, mind-expanding games, and realistic simulations. We take our business seriously, but we have fun too. We are convinced that you will, too, when you go exploring with the **Atari Explorer** family.

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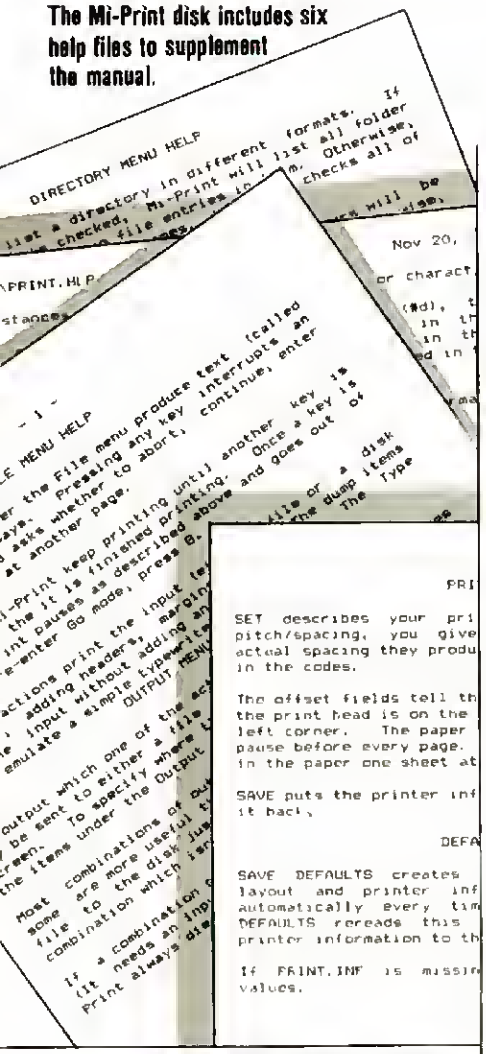


The Mi-Print disk includes six help files to supplement the manual.

A versatile printer utility for the ST from MichTron

Mi-Print

System: Atari ST
Price: $29.95
Summary: Versatile utility program for printing unformatted files.
Manufacturer:
MichTron
576 S. Telegraph
Pontiac, MI 48053
(313) 334-5700

MichTron's *Mi-Print* is a print utility program designed to print ASCII text files in any format you specify. Specifically, you can control paper size, margins, headers, page numbers, pitch, and line spacing. If you use several different printers or styles of output, you can save them on disk and recall them later. *Mi-Print* will also list directories, including files in subfolders.

Why would you want *Mi-Print* in addition to a word processing program? Several reasons. The main value of *Mi-Print* is for printing out data from bulletin board systems, help files, on-line user manuals, and program listings—anything not previously formatted. In addition, many printers are capable of printing in a variety of styles, pitches, and line spacings, some of which cannot be selected from a word processing program; *Mi-Print* lets you easily utilize these printer features.

To use *Mi-Print*, you must first load the program in medium- or high-resolution mode. You then describe your printer to the program. *Mi-Print* includes the default sequences for a Panasonic 1091 printer, which are generally similar to those of other Epson-compatible parallel dot matrix printers. For example, for the Atari SMM804, we had to change only one code, the one to specify compressed print (the Panasonic code is Escape 18 whereas the Atari printer wants only 18 without the Escape). A commonly used control character is Escape (decimal 27), but because it is so frequently used, *Mi-Print* allows the use of a dollar sign ($) as a shorthand representation of the code. After entering the control sequences for your printer(s), you can then save them to the disk making sure, of course, that it is write enabled.

Next, you set your desired page style. The default values may be quite satisfactory (1″ margins all around; header line with name of file, page, date, and time; standard Pica print; and standard line spacing). However, if you want to change anything, it is easy to do on this screen. Again, you can save your page style on the disk.

Mi-Print can print text to three devices: printer, screen, and disk. Before printing any file on the printer, we would advise viewing it on the screen. You can always abort the screen print after one page if it is satisfactory; on the other hand, you can waste a great deal of paper printing unsatisfactorily formatted files.

An added feature of *Mi-Print* is a typewriter mode. Not a substitute for a word processor, this mode is useful for addressing envelopes or typing very short memos.

Some nits. The right and left margin settings work only on files with no formatting whatsoever. Thus, if a file was produced with a word processing program, the line feed/carriage returns inserted by the wp program take precedence over *Mi-Print*. To print a file created by a word processor, the *Mi-Print* margins must be set at least as wide as they were in the original wp program.

Second, *Mi-Print* prints everything right justified; we would like the option of printing ragged right. We would also like to see a double-space option.

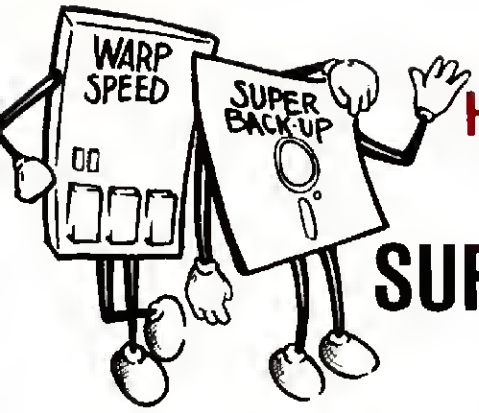
Third, the 12-page instruction booklet is fine as far as it goes, but it just doesn't go far enough. Specifically, we would like to see samples of each menu. Even printing out the help screens—the first thing you should do after making a backup copy of the disk—although helpful, were not as good as actual examples would have been.

Last, the manual should include a bold warning that the program works only with ASCII text files; we spent many frustrating minutes trying to print out a *1ST Word* file and getting nothing but bizarre looking output without spaces between words.

We tried using *Mi-Print* for two things not intended by MichTron but that seemed as though they ought to be within the capabilities of the program. First, we tried to configure a printer—an older Mannesman Tally 160L—that, although parallel, is just non-standard enough not to work with the ST. It didn't work with *Mi-Print* either. We also tried to use the program with a *serial* Daisywriter printer with similar unsatisfactory results.

All in all, *Mi-Print* is a useful program, especially for printing out raw ASCII files. It has limitations, but they are far outweighed by its advantages. It is versatile, easy to use, and makes an ideal companion to your favorite word processor. ■

By DAVID H. AHL



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It was snowing, and it was going to snow.
—Wallace Stevens

Results of Challenge # 1: TV Snow

Programming Challenge

Dragon Elite illustration by Peter Kelley

By JOHN JAINSCHIGG

Frost bloomed transparent at a touch of breath. Wiping black ice from a corner of the pane, the printer peered out into a howling chaos of snow and bitter wind. "Worst blizzard of last- minute entries I've ever seen," he thought. "They'll never close the contest now . . ."

Yet, moments later, a hearty cry of "41 55 53 48!" (that's "MUSH!" in hex) rang through the waste! On they came! A team of robot huskies, pulling a sleigh piled high with floppy disks . . . their howling put the moaning wind to shame! "A miracle!" The printer thought. What superman had driven through this blast and brought the contest to a close at last?

Nanosec of the North, senior technical Eskimo of *Atari Explorer* magazine, that's who! Welcome to another Programming Challenge, folks. As promised, the results of Challenge #1 are finally in. Entries were received from all across the U.S. and Canada, and the overall technical quality was very high—so high, in fact, that we chose a couple-three winners. But before we introduce them (and their code), and disappoint the rest of you (better luck next time), let's pause for a brief overview of contest entries and techniques.

Listing 1. TV SNOW by Andrew Kobetitsch

ATARI KEY

- Atari 130XE Computer
- OSS Basic XE (Extensions loaded)

```
10 Rem ***       TV snow           ***
20 Rem *** by Andrew Kobetitsch ***
30 Rem *** Programing Challenge ***
40 Rem *** For  Atari  Explorer ***
50 Fast
60 Consol=53279
70 Graphics 8+16
80 Poke 710,0:Rem SETUP,BLACK
90 B=Dpeek(560):Rem LOCATION OF DISPLAY LIST
100 Poke 559,0:Rem TURN OFF ANTIC
110 Toploc=B+4:Rem TOPLOC IS THE POINTER TO THE TOP HA
LF OF THE SCREEN MEMORY
120 Botloc=B+100:Rem THIS IS THE POINTER TO THE BOTTOM
 HALF OF THE SCREEN MEMORY
130 Dpoke Toploc,Dpeek(Botloc):Rem MAKE THE TOP HALF O
F THE SCREEN LOOK AT THE SAME MEMORY AS THE BOTTOM
140 Poke 559,34:Rem TURN ANTIC BACK ON
150 Orgvalue=Peek(Toploc):Rem REMEMBER WHAT YOU ORIGIN
ALLY HAD IN THE LOWER BYTE OF THE POINTER
160 N=254-Orgvalue:Rem N WILL BE THE FACTOR BY WHICH Y
OU'RE MOVING TO THE RIGHT
170 Scr=Dpeek(88):Rem SCREEN MEMORY
180 Rem NOW FILL THE SCREEN MEMORY WITH RANDOM NUMBES
190 For P=Scr+3759 To Scr+7680+255 Step 2
200   Poke P,Rnd(0)*254+1:Poke P+1,Rnd(0)*254+1
210 Next P
```

(continued)

```
220 Sound 0,150,8,7:Sound 1,35,8,4:Sound 2,10,8,4:Soun
d 3,2,8,13:Rem AHH--THE SOUND OF WINTER SNOW
230 While (Peek(Consol)=7):Rem PRESSING START, SELECT
OR OPTION ENDS THIS THING
240   Q=Rnd(0)
250   Rem THE TWO HALVES OF THE SCREEN LOOK AT THE SCR
EEN MEMORY, SHIFTING A RANDOM NUMBER TO THE RIGHT.
260   Rem ORGINAL VALUE MUST BE REMEMBERED AND SUBTRAC
TED FROM THE SHIFT SO THAT YOU NEVER SHIFT LEFT AND
270   Rem READ THE END OF THE DISPLAY LIST
280   Poke Toploc,Q%N+Orgvalue
290   Poke Botloc,Q%N+Orgvalue
300 Endwhile
310 ? "IS IT REAL OR MY ATARI?"
320 End
```

Listing 2. TV SNOW by Brad Mott

ATARI KEY

- Any Atari 8-Bit Home Computer
- Atari Basic

```
5 DIM A$(27)
10 GRAPHICS 1+16:DL=PEEK(560)+PEEK(561)*256:POKE DL+8,
7
15 POSITION 0,3:? #6;"artificial  tv snow"
20 POSITION 3,7:? #6;"BY: BRAD MOTT":POSITION 5,10:? #
6;"10-9-1986"
25 GOSUB 200
40 POKE 53768,64+4+2
45 POKE 53761,15:POKE 53760,25
50 POKE 53763,10:POKE 53762,15
97 REM ******************
98 REM *** MAIN LOOP ***
99 REM ******************
100 POKE 53272,PEEK(53770):POKE 53272,PEEK(53770):POKE
 DL,INT(RND(0)*8)*16:POKE DL+1,INT(RND(0)*8)*16
110 POKE 53272,PEEK(53770):POKE 53760,INT(RND(0)*15)+1
0:POKE 53272,PEEK(53770):POKE DL,112:POKE DL+1,112
120 GOTO 100
197 REM ******************************
198 REM *** P/M,DLI,&SCREEN SETUP ***
199 REM ******************************
200 POKE 54279,56:POKE 623,33
205 POKE 53277,3
210 FOR T=0 TO 3:POKE 53248+T,0:POKE 53256+T,3:POKE 70
4+T,10:NEXT T
220 FOR T=15360 TO 15360+725:POKE T,255:NEXT T
225 RESTORE 500:FOR T=0 TO 20:READ A:POKE 1536+T,A:NEX
T T
230 FOR T=1 TO 27:READ A:A$(T,T)=CHR$(A):NEXT T
235 GRAPHICS 8+16:POKE 559,0:POKE 712,10:POKE 710,0:PO
KE 709,0:DL=PEEK(560)+PEEK(561)*256
240 POKE 512,0:POKE 513,6:FOR T=1 TO 7:A=USR(ADR(A$)):
NEXT T
245 POKE 54286,192
250 FOR T=DL+6 TO DL+200:IF PEEK(T)=15 THEN POKE T,15+
128
255 NEXT T:POKE 559,62:RETURN
497 REM ********************
498 REM *** DATA FOR ML ***
499 REM ********************
500 DATA 72,173,10,210,141,0,208,173,10,210,141,1,208,
173,10,210,141,2,208,104,64
510 DATA 104,165,88,133,204,165,89,133,205,162,30,160,
0,145,204,136,173,10,210,208,248,230,205,202,208,243,9
6
```

Secrets of the Snow Pros

A number of entrants tried creating a snow effect using the good old "brute force" approach—writing random data directly into screen RAM. By and large, our judges sniffed at this method, saying that it achieves only borderline performance while straining processor resources to the max.

Eight-bit entrants tried a variety of character mapping techniques, drawing visually meaningless data from ROM or RAM by tweaking the character set bitmap table pointer at location 756 decimal. This approach has a lot of potential, but considerable care and planning are required to prevent a visible character grid from spoiling the illusion. Nobody quite made it, though one entry (which drew bitmap information directly from POKEY's memory-mapped I/O region, creating a self-animating display) came very, very close.

Other 8-bit entrants tried filling players with random bitmap data and moving them rapidly across the screen by writing to their horizontal position registers. Because players seem to float above the playfield, this technique doesn't create a convincing illusion on its own. Overlaid on an appropriate playfield-level pattern, however, it works very well.

By far the most-used approach was page-flipping—drawing pixel garbage from various places in memory by altering screen RAM pointers. On 8-bit systems, this is done by tweaking the address fields of Load Memory Scan instructions in the display list. On the ST, it's done by altering the physical base pointer of the screen, via a TOS call. The technique is easy to implement, involves little process overhead, and permits close aesthetic control of the effect produced. A winning combination!

The Envelope, Please . . .

Here, then, in no particular order, are our winners . . . the best of the best, the cream of the crop, the ones who got their entries in on time and didn't write in crayon:

Andrew Kobetitsch, a "soon to be 20"-year-old Comp Sci major at St. John's University, sent us a killer illusion for the 130XE, written in OSS Basic XE (Listing 1). Andrew used display list modification to create the screen effect in graphics mode 8. He wastes a little time filling the screen with random data (coulda gotten it from ROM,

Andrew), but the resulting pixel distribution is very nice.

Andrew's sound effects are also prime. He writes "I just put my TV on a blank UHF channel, and flipped back and forth between it and the computer's channel until they sounded the same." Just shows to go you, there's no substitute for fundamental research.

Certain of our judges took exception to the fact that Andrew misspelled the French imperative "voila" in his documentation, but they were overruled by majority vote. What's good enough for Miss Piggy is good enough for us.

Brad Mott, a junior at Union High School in Harrells, NC, sent us an Atari Basic program that uses animated P/M graphics to overlay a static background of random data (Listing 2). The players are driven via a display list interrupt routine—a nice approach, because it leaves lots of processing time free and all the other interrupts uncluttered. Brad adds a nice touch by tweaking the display list to bounce the screen up and down. Not bad, Brad.

Terrence Vaughn, of West Covina, CA, is an "over the hill Atari owner (me, not the Atari!) with nothing better to do than simulate an untuned tank circuit." If you're under the impression that only kids can hack, check out Terrence's code in Listing 3. It can be assembled using the OSS MAC 65 assembler cartridge (or, with minor modifications, any other standard assembler) and executed via the "L" option on the DOS menu.

Terrence is using display list manipulation to create his snow effect. He has implemented vertical roll by tweaking the D/L as well.

On the ST side, here's an elegant little C routine for the ST, written by Maria Bernard of New York, NY. It can be compiled using Mark Williams C and should, with few adjustments, work well with other compilers, too. Maria's technique employs TOS functions to reset the display screen's physical base pointer to random locations in low memory. The hissing sound is obtained by setting the ST sound chip to produce white noise.

Challenge #3

Our next Programming Challenge is somewhat more complex. Here's the scenario: you're designing a program to play chess, and you realize that before you get into all the multi-ply analysis and AI heuristics rigamarole, you've

Listing 3. TV SNOW by Terrence Vaughn

ATARI KEY

- Any Atari 8-Bit Home Computer
- MAC 65 Assembler (OSS, Inc.)

```
10 ;IOCB EQUATES
20 ICCDM =   $0342   ;CMD BYTE
30 ICBAL =   $0344   ;BUF ADR-LD BYTE
40 ICBAH =   $0345   ;BUF ADR-HI
50 ICBLL =   $0348   ;BUF LEN-LD BYTE
60 ICBLH =   $0349   ;BUF LEN-HI
70 ICAX1 =   $034A   ;AUX BYTE 1
80 ICAX2 =   $034B   ;AUX BYTE 2
90 CIOV  =   $E456   ;CID ENTRY PT.
0100 ;DISPLAY EQUATES
0110 DSPL =  $3000   ;NEW DISPLAY LST
0120 SDLSTL = $0230  ;D LIST ADDRESS
0130 SDMCTL = $022F  ;ANTIC DMA
0140 SETVBV = $E45C  ;NEW VECTOR ROUTINE
0150     *=  $2000
0160     CLD
0170     LDX #0      ;SET UP NEW DLST
0180     LDA #79     ;GR. 8
0190     STA DSPL,X  ;NO TDP BORDER
0200     INX         ;USE ROM FOR 'SNOW'
0210     INX         ;DON'T CARE ABOUT LD BYTE
0220     LDA #$E4    ;ROM HI BYTE
0230     STA DSPL,X  ;DATA ADDRESS
0240     LDA #15     ;GR. 8 SCAN LINE
0250 SET1 INX        ;LOOP FOR
0260     STA DSPL,X  ;251 LINES
0270     CPX #252
02B0     BNE SET1
0290     LDA #65     ;JMP INSTRUCTION
0300     STA DSPL,X
0310     INX
0320     LDA #DSPL&255 ;LO ADR
0330     STA DSPL,X
0340     INX
0350     LDA #DSPL/256 ;HI ADR
0360     STA DSPL,X  ;DL FINISHED
0370     LDX #1      ;BDOT WAS OK
0380     STX $09
0390     DEX         ;WON'T BE
0400     STX $0244   ;RETURNING
0410 ENTRY
0420     LDA #PRDMPT&255
0430     STA ICBAL,X ;GET
0440     LDA #PRDMPT/256 ;THE PRDMPT
0450     STA ICBAH,X
0460     TXA
0470     STA ICBLH,X
0480     LDA #255
0490     TAY
0500     STA ICBLL,X
0510     LDA #9      ;PUT RECORD
0520     STA ICCOM,X
0530     LDA #10     ;Y-AXIS
0540     STA $54
0550     LDA #2      ;X-AXIS
0560     STA $55
0570     STX $56
0580     JSR CIOV    ;ON SCREEN
0590     LDA #8      ;NO BUTTON PUSH
0600     STA $D01F   ;ON CONSOLE
0610 CHK1
0620     LDA $D01F   ;CHECK BUTTONS
0630     CMP #7      ;ANY PUSHED?
0640     BCS CHK1    ;IF NOT- LOOP
0650     STY $02FC   ;ND KEY PRESSED
0660     LDX #$60    ;IOCB #6
0670     LDA #3      ;OPEN COMMAND
0680     STA ICCOM,X
0690     LDA #SCR&255 ;DISPLAY HANDLER
0700     STA ICBAL,X
0710     LDA #SCR/256
0720     STA ICBAH,X
0730     LDA #12     ;NO WINDOW
0740     STA ICAX1,X
```

got to establish some data structures to store the chessboard and the pieces, and establish a rule structure that will let your program determine the legality of moves.

We want to see your data formats and logic structures for handling basic chess transactions. This is not an exercise in user-interface design. All your program has to do is remember where the pieces are and tell us if a move is legal or not. Moves can be entered in any notation you prefer.

The trick is to do all this with a minimum number of decision statements. Long trees of IFs and THENs will not impress. What will impress is your developing a system of formulae that will analyze the geometry of a proposed move and return a Boolean result for its legality. Have fun! ■

Listing 4. TV SNOW by Maria Bernard

ATARI KEY

- Any Atari ST Computer
- Mark Williams C-Language Development System

```
#include <osbind.h>

main()
{
   static char giaval[] = { 0,60,0,0,0,0,20,8,5,0,15,0
,0,0 };
   char *oldscr,v;
   int i;

   /* Save and adjust PSG registers for coarse white n
oise */
   for (i=0;i<14;v=Giaccess(0,i),Giaccess(giaval[i],i|
128),giaval[i++] = v);
   /* Save current screen base */
   oldscr = Physbase();
   /* Until keypress, display a randomly-selected memo
ry area */
   while(!Bconstat(2)) Setscreen(-1L,(char*) Random(),
-1);
   /* Restore old screen base */
   Setscreen(-1L,oldscr,-1L);
   /* Restore PSG registers */
   for (i=13;i>=0;Giaccess(giaval[i],i--|128));
   /* ... and split */
   exit(0);
}
```

```
0750      LDA #8        ;GR. 8
0760      STA ICAX2,X
0770      JSR CIOV      ;OPEN IT
07B0      LDX #$60
0790      LDA #$0C      ;CLOSE THE
0B00      STA ICCOM,X   ;IOCB
0B10      JSR CIOV
0B20      LDA #0        ;BLACK & WHITE
0B30      STA $02C6     ;BACKGROUND
0B40      LDA SDMCTL
0B50      ORA #3        ;NO SIDE BORDERS
0B60      STA SDMCTL    ;EITHER
0B70 ;SAVE VBLANK JUMP VECTOR
0880      LDA $0222
0B90      STA TEMP
0900      LDA $0223
0910      STA TEMP+1
0920 ;SET UP NEW VECTOR
0930      LDA #6        ;IMMEDIATE VECT
0940      LDX #VBLANK/256 ;HI BYTE
0950      LDY #VBLANK&255 ;LO BYTE
0960      JSR SETVBV    ;DO IT
0970 ;GOT 'SNOW'- FORGET IT
09B0      LDA #0        ;INITIALIZE
0990      STA $D20B     ;SOUND
1000      LDA #3        ;REGISTERS
1010      STA $D20F     ;NO SOUND
1020      LDA #134      ;DISTORT AT LOW VOLUME
1030      STA $D201     ;AUDC1
1040      LDA #2        ;FREQ.
1050      STA $D200     ;AUDF1
1060      LDX #255      ;NO KEY
1070      STX $02FC
10B0 WAIT
1090 ;WAIT FOR SIGNS
1100      LDA $02FC     ;OF INTELLIGENT
1110      CMP #255      ;LIFE
1120      BEQ WAIT      ;NONE YET
1130      STX $02FC     ;CLEAR IT!
1140      INX           ;LIFE !
1150      STX $D201     ;SOUND OFF
1160      LDA SDMCTL    ;BACK TO NORMAL
1170      AND #254      ;PLAYFIELD
11B0      STA SDMCTL
1190      LDA #6        ;LET'S CANCEL
1200      LDX TEMP+1    ;THE VBLANK
1210      LDY TEMP      ;ROUTINE
1220      JSR SETVBV
1230 ;LET THE OS GET A NEW SCREEN
1240 ;AND BACK TO MENU
1250      LDX #0        ;EDITOR
1260      JMP ENTRY
1270 VBLANK
1280      LDX #1        ;SCREEN MEM LO
1290      LDA $D20A     ;GET RANDOM #
1300      STA DSPL,X    ;PUT IN DLIST
1301      INX           ;HI ADDRESS
1302      CMP #7        ;RANDOM ROLL
1303      BCS VB1       ;DON'T INCREMENT
1304      INC DSPL,X    ;ROLL IT!
1305 VB1
1306      LDA DSPL,X    ;CHECK FOR MEMORY
1307      CMP #$EF      ;OVERRUN
130B      BCC VB2       ;NO PROBLEM
1309      LDA #$E4      ;ORIGINAL POINT
1310      STA DSPL,X    ;IN DLIST AGAIN
1311 VB2
1312      LDA #DSPL&255 ;LO ADDRESS
1320      STA SDLSTL    ;OF DLIST
1330      LDA #DSPL/256 ;HI BYTE
1340      STA SDLSTL+1  ;TELL ANTIC
1350      JMP $E45F     ;ALL DONE
1360 SCR
1370      .BYTE "S:",$9B
1380 PROMPT
1390      .BYTE "   PRESS START FOR 'SNOW'      "
1400      .BYTE " PRESS ANY KEY TO COME BACK",$9B
1410 TEMP
1420      .BYTE 0,0
1430      .END
```

Part 2: A closer look at the GEM Virtual Device Interface

An Introduction to GEM VDI

By BOB COCKROFT

Last issue, we introduced GEM VDI and discussed most of the VDI line-drawing functions. Here we go on to describe some of the more advanced graphics functions of VDI, including those used to set general drawing attributes, create geometric outlines and filled forms, fill arbitrary regions, and do low-level mouse handling. In the process, we will increase your VDI vocabulary and reveal how a full-scale GEM application is organized.

Program examples in this article were composed using the Mark Williams C-Language Development System, but should, with few modifications, be convertible to work with Alcyon, Megamax, and other popular compilers.

VDI Graphic Attributes

To simplify the task of creating complex graphics, the VDI permits you to set general graphic *attributes* for each virtual screen workstation you open. Last issue, we discussed setting attributes to control the general style, end-styles, width, and color of lines. Now let's learn how to set attributes for filled areas.

Fill Color Index

Color 1, normally set to black, is the default color index for fills. Change it using the vsf_color( ) function, as follows:

```
vsf_color(handle,color_index);
```

where "handle" is your workstation handle and "color_index" is the number of the color you want to use. As you may remember from our discussion of vsl_color( ), there are 16 color indices available in the ST low-res mode, four in medium-res, and two in monochrome (numbered 0-15, 0-3, and 0-1, respectively). The default chroma corresponding to these indices are shown in Figure 1.

Changing the chroma for a given index is done with the vs_color( ) function, as follows:

```
/* declare a 3-element short integer array */
int rgb_in[3];
/* set value of red component (0-7) */
rgb_in[0] = red;
/* set value of green component (0-7) */
rgb_in[1] = green;
/* set value of blue component (0-7) */
rgb_in[2] = blue;
/* set RGB chroma for color index */
vs_color(handle,color_index, rgb_in);
```

Fill Interior Style

Fills are normally performed with solid color, but patterned, hatched, and user-defined fills are also supported. The vsf_interior( ) function is used to set a general fill style.

```
vsf_interior(handle,style);
```

where "style" is a number from the table in Figure 2.

Fill Style Index

If a patterned or hatched fill interior style is selected, pattern 1 (a dotted pattern) or hatch 1 (diagonal, solid-line hatching) will be used automatically unless another pattern or hatch style index is selected. Figure 3 shows the available patterns and hatches, including the defaults.

To select an alternative pattern or hatch style index, the vsf_style( ) function is used as follows:

```
vsf_style(handle,style_index);
```

where "style_index" is a pattern or hatch index number drawn from Figure 3.

User-Defined Patterns

If the user-defined fill interior style is selected, areas will be filled with solid color unless a fill pattern is defined. This is an extension of the process used

Index	Color	Display resolution
0	White (background)	\ \ \ High
1	Black	| | Medium /
2	Red	| |
3	Green	| /
4	Blue	|
5	Cyan	|
6	Yellow	|
7	Magenta	|
8	White	> Low
9	Black	|
10	Light Red	|
11	Light Green	|
12	Light Blue	|
13	Light Cyan	|
14	Light Yellow	|
15	Light Magenta	/

Figure 1. Default color settings.

```
0 -- Hollow. Solid background color is used for
     filling.

1 -- Solid. Solid foreground color is used for
     filling.

2 -- Pattern. Area is filled with a pattern in
     foreground color. Default pattern (pattern
     index 1) will be used unless another
     built-in pattern is chosen.

3 -- Hatch. Area is filled with a regular
     cross-hatching in foreground color. Default
     hatch (hatch index 1) will be used unless
     another built-in hatch is chosen.

4 -- User-defined. Area is filled with the
     user-defined pattern in foreground color.
     If the user fails to define a pattern, solid
     color fill will be performed as in 1, above.
```

Figure 2. Fill styles.

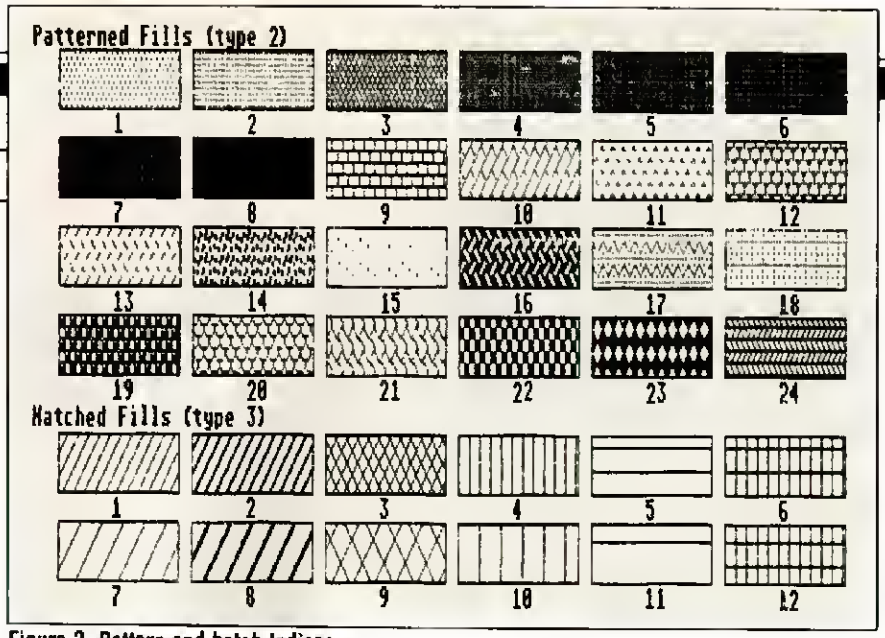


Figure 3. Pattern and hatch indices.

to define line patterns, a subject we postponed covering in our last issue.

As you may recall, the vsl__type( ) function is used to select line type from one of seven options. Issuing a vsl__type( ) call in the following manner:

```
vsl_type(handle,7);
```

selects the user-defined line style. Once this call is made, a solid line style will be used unless a line pattern is defined.

To define a line style, the vsl__udsty( ) function is used as follows:

```
vsl_udsty(handle,pattern);
```

where "pattern" is a two-byte (word) value (expressed in decimal, hex, or octal), whose binary representation describes your pattern as a series of 1's (corresponding to "on" pixels) and 0's (corresponding to "off" pixels). Some sample patterns are defined in Figure 4.

User-Defined Fills

Line bitmaps operate in only one dimension. A basic fill pattern is defined by arranging 16 one-dimensional bitmaps one above another, forming a two-dimensional array (see Figure 5).

Using graph paper marked off in 16 x 16 square blocks, it is easy to design a fill pattern, convert each line to a 16-bit binary number, and derive its decimal, hex, or octal value.

To set up the pattern under VDI, begin by placing its values in sequential elements of an integer array:

```
int pfill_pat[] =
    {0x0000,0xFFFF,0x0000,0xFFFF,
     0x0000,0xFFFF,0x0000,0xFFFF,
     0x0000,0xFFFF,0x0000,0xFFFF,
     0x0000,0xFFFF,0x0000,0xFFFF};
```

Then, pass the array to the vsf__udpat( ) function, as follows:

```
vsf_udpat(handle,pfill_pat,
planes);
```

where "pfill__pat" is the name of the array that holds your pattern values, and "planes" is the number of 16-value groups it contains. You might infer from this that multi-plane patterns are also possible, and this is, in fact, true.

To define a multi-plane bitmap, more than one "plane" (a group of 16 values, defining a 16 x 16 bitmap) is required (up to four may be supplied). In executing the pattern, each plane is "stacked" on top of the others (conceptually speaking), the corresponding bits in each pixel position forming a multi-bit color index value for the pixel. We will be dealing with multi-plane graphics in greater detail in subsequent issues.

Fill Perimeter Visibility

Normally, a solid line of color appears around a filled area to define it. To turn this attribute on or off, the vsf__perimeter( ) function is used as follows:

```
vsf_perimeter(handle,per_vis);
```

where "per__vis" is 0 for an invisible perimeter; and greater than 0 for a visible perimeter. Perimeter visibility is set "on" as a default when your workstation is opened.

VDI Drawing Primitives

Now that we know a little more about VDI graphic attributes, we can examine some of the VDI *drawing primitives*—functions that draw disks and circles, ellipses, ares and pie-slices, and rectangles. Each of these functions performs in accordance with certain of the graphic attributes we have just discussed.

Circles

The function v__circle( ) draws a filled circle of a given size at a specified screen location. It is called as follows:

```
v_circle(handle, x, y, radius);
```

where parameters x and y are the horizontal and vertical coordinates of the center of the circle, and "radius" is the length of the radius of the cirlee (in pixels under the raster coordinate system, in units under NDC), in the horizontal (x) direction. Because pixels are slightly taller than they are wide, the horizontal radius of a visually correct circle will be longer, in terms of pixels, than its vertical radius. The v__circle( ) function corrects this *aspect ratio* problem automatically, but you must remember to think in terms of horizontal pixels when specifying radius under the RC coordinate system.

The appearance of figures drawn

Hex	Decimal	Binary	Pattern produced
0xFFFF	65535	1111111111111111	Solid line
0xBBBB	43690	1010101010101010	Dotted line
0xEEEE	61166	1110111011101110	Dashed line

Figure 4. Sample values for line patterns.

	Bit pattern	Hex value
Byte 0	0000000000000000	0x0000
Byte 1	1111111111111111	0xFFFF
Byte 2	0000000000000000	0x0000
Byte 3	1111111111111111	0xFFFF
Byte 4	0000000000000000	0x0000
Byte 5	1111111111111111	0xFFFF
Byte 6	0000000000000000	0x0000
Byte 7	1111111111111111	0xFFFF
Byte 8	0000000000000000	0x0000
Byte 9	1111111111111111	0xFFFF
Byte 10	0000000000000000	0x0000
Byte 11	1111111111111111	0xFFFF
Byte 12	0000000000000000	0x0000
Byte 13	1111111111111111	0xFFFF
Byte 14	0000000000000000	0x0000
Byte 15	1111111111111111	0xFFFF

Figure 5. 16-word bitmap for a basic fill pattern composed of horizontal lines.

with v__circle( ) will depend on the setting of current fill area attributes: color, style, style index, and perimeter visibility.

Ellipses

The v__ellipse( ) function draws a filled ellipse. Call it as follows:

```
v_ellipse(handle,x,y,xradius,
yradius);
```

where x and y are the coordinates of the center of the ellipse you wish to draw. The parameters "xradius" and "yradius" are measures of the horizontal and vertical radii of the ellipse, in pixels or NDC units. Under the NDC system, if the same value is supplied for both "xradius" and "yradius," the resulting figure will be a circle. This is not the case under the RC system, because of the aspect ratio problem discussed above.

As with circles, the appearance of ellipses varies with fill area attribute settings.

Arcs and Pie-Slices

The v__arc( ) and v__pieslice( ) functions are (among other things) useful for drawing the pie charts common in business graphics. The first function draws a partial circular outline and responds to attribute settings for lines. The latter draws a filled circular section and thus responds to fill area attributes. Both functions are called with the same parameters, as follows:

```
v_arc(handle,x,y,radius,begang,
endang);
v_pieslice(handle,x,y,radius,
begang,endang);
```

where x, y, and "radius" describe the center point and radius of the circle within which your arc or pie-slice will be drawn. Parameters "begang" and "endang" mark points on the perimeter of this circle where your arc or pie-slice begins and ends. "Begang" and "endang" may range from 0 to 3599, each unit representing $^1/_{10}$ degree, increasing in magnitude counterclockwise, as shown in Figure 6.

Elliptical Arcs and Pie-Slices

The functions v__ellarc( ) and v__ellpie( ) draw elliptical outlines and filled elliptical sections the same way v__arc( ) and v__pieslice( ) draw circular sections. They are called as follows:

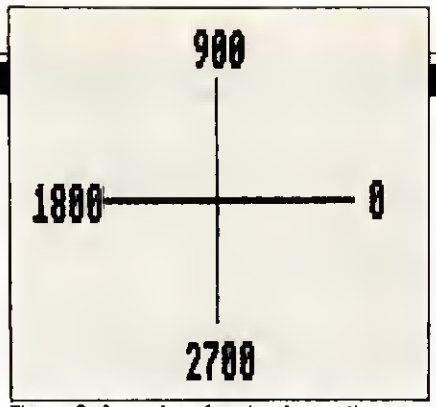


Figure 6. Arc values for circular sections.

```
v_ellarc(handle,x,y,xradius,
yradius,begang,endang);
v_ellpie(handle,x,y,xradius,
yradius,begang,endang);
```

where x and y are the coordinates of the center of the elliptical outline in which your arc or pie-slice will be drawn. "xradius" and "yradius" are the horizontal and vertical radii of that ellipse, and "begang" and "endang" are angle values for the beginning and end of the arc or pie-slice you wish drawn (ranging from 0 to 3599, as discussed above).

As with regular arcs, the appearance of elliptical arcs varies with line attributes. The appearance of elliptical pie-slices varies with fill attributes.

Bars and Rectangles

The v__bar( ) function draws rectangular outlines. Call it like this:

```
v_bar(handle,pxyarray);
```

where "pxyarray" is the name of a four-element integer array containing the (x,y) coordinates of the upper-left and lower-right corners of the bar you wish drawn. The array is set up as follows:

```
int pxyarray[4];
/* x-coordinate of upper left
corner */
pxyarray[0] = x1;
/* y-coordinate of same */
pxyarray[1] = y1;
/* x-coordinate of lower right
corner */
pxyarray[2] = x2;
/* y-coordinate of same */
pxyarray[3] = y2;
```

Naturally, v__bar( ) responds to fill area attributes.

Rectangular outlines with rounded corners can be drawn using the v__rbox( ) function, called in similar fashion to v__bar( ):

```
v_rbox(handle,pxyarray);
```

The function v__rfbox( ), called in the same manner, draws filled rounded rectangles.

Filled Forms and Regions

VDI provides additional functions for creating filled polygonal forms and filling polygons and arbitrary regions. The v__fillarea( ) function is used to create filled polygons. It is called like this:

```
v_fillarea(handle,points,pxyarray);
```

where "pxyarray" is an integer array containing a list of x and y coordinates, defining the vertices of a polygon, and "points" is the number of coordinate pairs this array contains. To define a filled triangle, for example, the following statements could be used:

```
/* declare input array */
int pxyarray[8];
/* x-coordinate of first vertex */
pxyarray[0] = 100;
/* y-coordinate of first vertex, e
tc. */
pxyarray[1] = 100;
pxyarray[2] = 150;
pxyarray[3] = 150;
pxyarray[4] = 100;
pxyarray[5] = 150;
pxyarray[6] = 100;
pxyarray[7] = 100;
/* draw filled triangle */
v_fillarea(handle,4,pxyarray);
```

Note that the start point is defined twice, to bring the outline of the polygon "back around" to where it began, creating a contained triangular region.

An arbitrary region, bounded by a specific color or by the edges of the display surface, can be filled with the v__contourfill( ) function as follows:

```
v_contourfill(handle,x,y,index);
```

where x and y define a point within the area to be filled, and "index" specifies a border color number. If "index" is a positive value, the fill process will be contained within boundaries drawn in this color. If negative, any color other than the color specified will act as a border.

Mouse Controls

Probably the most prominent aspect of the GEM desktop is the mouse-controlled cursor. Under GEM, the mouse cursor is used as an electronic finger to select from menus and manipulate icons and other objects. This increases the speed with which you can interact with the computer and minimizes use of the keyboard, which some find error-prone and frustrating.

In this next section, we will discuss

some of the VDI mouse-related commands. The responsibility of the VDI for the mouse is limited to hiding, displaying, and altering the form of the mouse cursor, setting its position, and retrieving basic information about mouse status.

Actually driving the mouse—converting its basic electronic signals to movement vectors—is performed lower down in the interrupt-driven ranges of the operating system. Higher-level functions that relate the mouse to the GEM environment of windows, icons, and objects are performed by the Application Environment Services package.

Hiding and Showing the Mouse Cursor

The best way to start a discussion of the mouse cursor is to explain how to make it disappear. In certain situations, the mouse cursor may be perceived as obtrusive. For example, when using *1st Word*, the mouse cursor isn't needed while entering text, so it goes away. Touching the mouse restores the cursor to visibility.

Hiding the mouse cursor requires a call to the function v__hide__c( ), as follows:

```
v_hide_c(handle);
```

Redisplaying it is done with the function v__show__c( ):

```
v_show_c(handle,flag);
```

where "flag" is usually given the value zero. A zero flag value means that regardless of how many times your application has called v__hide__c( ), the single v__show__c( ) call will make the mouse cursor visible. Using a non-zero value means that if your application has called v__hide__c( ) several times, the same number of v__show__c( ) calls is required to make the cursor reappear.

In effect, the state of visibility of the mouse cursor is "stacked," with true visibility possible only when the stack is empty. Why is the mouse cursor handled this way? Because it lets you write functions that handle the mouse differently when they are called at different levels, without making special provision for doing so in the functions themselves.

When the mouse cursor is visible, moving it across the screen causes the part of the display underneath it to be copied out, stored elsewhere, and then restored when the mouse moves to a new location. When the cursor is stationary, the save/restore sequence is, naturally,

MOUSE EDITOR

ATARI KEY

- Any Atari ST Computer
- Mark Williams C-Language Development System

```
#include <stdio.h>

/*
   Declare global control and data arrays for AES/VDI,
   workstation-related arrays and variables, resolution-
   related variables, pseudo-button-related variables,
   and an array to hold mouse cursor form data.
*/

int contrl[12],intin[128],ptsin[128],intout[128],ptsout[128];
int handle,xl,yl,work_in[12],work_out[57];
int x_upper,y_upper,x_lower,y_lower,row_step,col_step;
int ubut[4],mbut[4],lbut[4],dbut[4],x_ubut,y_ubut,x_mbut,
    y_mbut,x_lbut,y_lbut;
int pcur_form[37] = {0,0,1,0,1};

/*
   In main(), we initialize the application, open a VDI
   virtual screen workstation, do some calculations to
   determine screen resolution, call the mouse-editor,
   then close the workstation and exit the application.
*/

main()
{
   appl_init();
   open_vdi();
   resolution();
   editor();
   v_clsvwk(handle);
   appl_exit();
}

/*
   Wherein we create a screen display, dependent on the
   present resolution, that does a so-so job of imitating
   something made up with the Resource Construction Set.
   We'll be talking about the AES and resources in our
   next installment — until then, we'll have to be
   satisfied with pseudo-buttons.
*/

editor()
{
   do {

/* Hide the mouse cursor and clear the screen */

      v_hide_c(handle);
      v_clrwk(handle);

/* Draw the upper and lower grids for editing */

      draw_grid(x_upper,y_upper,row_step,col_step,16);
      draw_grid(x_lower,y_lower,row_step,col_step,16);

/* Generate some pseudo-controls */

      make_button(x_ubut,y_ubut,ubut,"RESTORE");
      make_button(x_mbut,y_mbut,mbut,"CURSOR");
      make_button(x_lbut,y_lbut,lbut,"EXIT");
      make_button(xl / 2,11,dbut,"                              ");
      } while(!active());
}

/* This function is the heart of the editor */

active()
{
   int pstatus,ex,my,i,dummy,press = 0;

/* Clear the relevant parts of the mouse form array */

   for(i = 5;i<37;pcur_form[i++] = 0);

/*
   Really cheating here. You know when you double-click on
   a program icon and the mouse cursor gets changed to a
   "Busy Bee" while the program loads and executes? Well,
   that's the cursor form an application inherits when
   it first starts up. Now, bees — cute as they are -- ain't
```

(continued)

paused—leaving whatever is "underneath" the cursor in the temporary storage buffer of the mouse and leaving the cursor itself imprinted on the screen.

Opening and clearing a workstation will make the mouse cursor disappear, along with everything else. It won't, however, convince the mouse that it is truly invisible; nor will it clear the mouse buffer of what the mouse thinks is still stored underneath it. Thus, if the mouse is subsequently moved, the cursor will reappear, restoring part of the old screen in the process.

The problem is solved by formally hiding the mouse prior to clearing the workstation, then making it reappear afterward. Hiding the mouse cursor restores the screen and renders the save/restore process inactive, though the mouse can still be moved. When v__show__c( ) is called, the first step in making the cursor reappear is to grab and store whatever is currently underneath it—i.e., part of your new workstation screen.

Sampling the Mouse Button State

The function vq__mouse( ) lets you examine the state of the mouse buttons and the current location of the mouse cursor. The function is called as follows:

```
vq_mouse(handle,&pstatus,&x,&y);
```

where "pstatus," x, and y are two-byte (*word*, or *short integer*) values in which the button status, horizontal, and vertical mouse coordinates will be stored as a result of the call. The value stored in pstatus is zero if neither mouse button is pressed. Bit 0 is set if the left button is pressed; bit 1, if the right button is pressed. If both buttons are pressed, both bits are set, giving pstatus a value of 3.

To examine the state of a given button, AND (binary) pstatus with 1 or 2, as appropriate:

```
if(pstatus & 1) printf("Left but
ton.\n");
else if(pstatus & 2) printf("Rig
ht button.\n");
```

Setting the Mouse Cursor Form

The mouse cursor is not limited to the familiar arrow and busy bee shapes. With the help of the vsc__form( ) function, a new bit pattern, defining the mouse form, can be engaged.

MOUSE EDITOR (continued)

```
   the greatest tools for graphic editing ... the wings get
   in the way, y'know? So to get an arrow cursor back, we
   have to do something deliberate, and unfortunately, it's
   something we haven't studied yet. graf_mouse() is a very
   powerful AES function that lets you change the form of the
   mouse cursor to any one of the system-supported shapes, or
   to a user-defined shape. The present setting changes it to
   an arrow. Try changing the "0" to a 3 for a "hand with
   pointing finger," or to a 5 for a "thin cross-hair."

   Besides letting us initialize the cursor as we like, the
   graf_mouse() function in this position also serves to
   restore the original form of the cursor if you've set it
   to some weird shape using the mouse editor.
*/

   graf_mouse(0,dummy);

/* Show the mouse cursor, now that it looks normal. */

   v_show_c(handle,0);

/* Main editing loop: until the millennium ... */

   while(1){

/* Check that mouse! Retrieve button status and coords. */

   vq_mouse(handle,&pstatus,&mx,&my);

/*
   If no buttons are being pressed, reset a flag to prove
   it. Respond to a button press only when the flag is zero,
   meaning that if the user decides to ride the buttons, our
   routine won't act as if the button has been pressed many
   times. User must press and release the button before we'll
   respond to another press.
*/

   if(!pstatus) press = 0;

/* On the other hand, if we've received a legit button press ... */

   if(pstatus && !press){

/*
   Set the flag to prove it, then bracket-test to see if the
   cursor is in either of the editing boxes. If so, darken or
   clear the appropriate cells (set_bits()) if necessary, and
   display the altered value for the word (display_data()).
*/


      press = 1;
      if (mx >= x_upper && mx < x_upper + 16 * col_step  &&
          my >= y_upper && my < y_upper + 16 * row_step) ||
          (my >= y_lower && my < y_lower + 16 * row_step)){

/*
   If user has pressed the left button, a pixel must be changed;
   otherwise, only the present value need be displayed.
*/
         if(pstatus & 1) set_bits(mx,my);
         display_data(my);
         }


/* Else if user has pressed RESTORE, exit and re-enter */

      else if (mx >= ubut[0] && mx < ubut[2] &&
               my >= ubut[1] && my < ubut[3]){
         invert_button(ubut);
         return(0);
         }


/* Else if user has pressed CURSOR, change the cursor. */

      else if (mx >= mbut[0] && mx < mbut[2] &&
               my >= mbut[1] && my < mbut[3]){
         v_hide_c(handle);
         invert_button(mbut);
         vsc_form(handle,pcur_form);
         invert_button(mbut);
         v_show_c(handle,0);
         }
```

```
/* Else if user has pressed EXIT, do so. */

      else if (mx >= ibut[0] && mx < ibut[2] &&
               my >= ibut[1] && my < ibut[3]){
         invert_button(ibut);
         return(1);
         }
      }
   }
}

/*
   Obtain a workstation handle, open a VDI virtual screen
   workstation, and recover screen boundaries.
*/

open_vdi()
{
   int i,d;

   for(i=0;i<10;work_in[i++]=i); work_in[10]=2;
   handle = graf_handle(&d,&d,&d,&d);
   v_opnvwk(work_in,&handle,work_out);
   xl = work_out[0]; yl = work_out[1];
}

/* Calculate resolution-dependent values for object placement. */

resolution()
{
   row_step = yl / 50; col_step = xl / 48;
   x_upper = x_lower = xl/3;
   y_upper = 10 * row_step; y_lower = 27 * row_step;
   x_ubut = xl / 4; x_mbut = x_ubut * 2; x_lbut = x_ubut * 3;
   y_ubut = y_mbut = y_lbut = 48 * row_step;
}

/*
   Draw a square grid in a rapid and slightly tricky way.
   Note that only one point-storage array is used to support
   two line-drawing operations per iteration, via a pointer.
*/

draw_grid(x,y,rd,cd,sq)
int x,y,rd,cd,sq;
{
   int i,p[8];

   p[0] = p[4] = p[6] = x; p[1] = p[3] = p[5] = y;
   p[2] = x + sq * cd; p[7] = y + sq * rd;

   for(i = 0;i <= sq;i++){
      v_pline(handle,2,p); v_pline(handle,2,p + 4);
      p[1] = p[3] += rd; p[4] = p[6] += cd;
      }
}

/*
   Make a fake button, centered around a given x,y location.
   Store size and location values directly in an array, and
   pass them back to the calling function for later access.
   The v_gtext() call writes graphic text on the display at
   a given pixel (not character cell) location. We'll be
   covering it in detail, next issue.
*/
make_button(x,y,array,string)
int x,y,*array;
char *string;
{
   *array = x - (strlen(string) * 8 / 2) - 4;
   *(array + 2) = (*array) + 8 + strlen(string) * 8;
   *(array + 1) = y - 10; *(array + 3) = y + 4;
   v_rbox(handle,array);
   v_gtext(handle,(*array) + 4,y,string);
}

/*
   Invert the pixels in a button, turning it black to denote
   that it has been selected. To do this, alter the VDI "write
   mode" (the way in which VDI functions put pixels on the
   screen) to XOR (mode 3), using the function vswr_mode().
   The normal write mode is replace, which lets graphics
   commands simply write over what's on the screen. In XOR
   mode, the system performs a Boolean Exclusive OR
   between what you're putting on the screen and what's already
```

(continued)

A mouse cursor bitmap is defined in two 16 × 16 bit planes, called the *mask* and *data* planes, each comprising 16 two-byte values. Each plane contains part or all of the image of a mouse cursor, expressed as 1's in a field of 0's. A different color index can be used to draw each plane, meaning that a mouse cursor can have up to two colors. If a 1 in the mask plane lies over a 1 in the corresponding position of the data plane, only the data plane color will show in that position.

Designing a new mouse cursor is similar to designing a fill pattern—a fairly simple matter, though tedious. When finished, you end up with 32 two-byte values—16 for the mask plane and 16 for the data plane.

Once you have them, you begin the redefinition process by declaring a 37-element short integer array (called pcur_form in these examples, its name is arbitrary), and placing these values in elements 5 through 36 (5-20 contain the mask plane values; 21-36, the data plane values). The remaining elements of the array control other parameters relevant to your mouse form, as follows.

Hot Spot

The "hot spot" is the exact pixel on your mouse cursor that defines the mouse position for the computer. When using the cursor to select an item, press a radio button, or perform other tasks, the hot spot must be poised over the item or object in question for things to work. To define the hot spot for your custom cursor, set elements 0 and 1 of the pcur_form array to appropriate horizontal and vertical offsets from the upper left-hand corner of the bitmap. For the standard arrow cursor, the hot spot is located 4 pixels in from the left and 7 pixels down from the top. It could thus be defined as follows:

```
pcur_form[0] = 4; /* horizont
al pixel offset */
pcur_form[1] = 7; /* vertical
 pixel offset */
```

Reserved Element

Element 2 of pcur_form is reserved for future use in later revisions of GEM. It must always be set to 1:

```
pcur_form[2] = 1;
```

Mouse Colors

Elements 3 and 4 of pcur_form are used in setting the color indexes for

drawing the mask and data planes. To display properly, the colors chosen must be available in the present graphics mode—if they aren't, color 1 (normally black) will automatically be used. The system's standard cursors set the mask color index to 0 (background color) and the data color index to 1, as follows:

```
pcur_form[3] = 0;   /* mask col
or index */
pcur_form[4] = 1;   /* data col
or index */
```

When all the elements of pcur_form have been set, the new cursor is displayed by calling the vsc_form( ) function as follows:

```
vsc_form(handle,pcur_form);
```

The Mouse Editor

As you may well imagine, altering the mouse form by changing all 37 elements of the pcur_form array is a tedious and time-consuming task. To minimize this problem, I have written a mouse editor in Mark Williams C. This program performs all the requisite "hack work" of mouse form design, freeing you to concentrate on more artistic considerations.

Although the mouse editor is quite easy to use, it employs many GEM calls and is quite long. Unfortunately, to make the program function as a typical GEM application, I have been forced to use an occasional function we haven't covered. I have documented the listing fairly thoroughly, so you should have no trouble following what is going on.

In the center of the mouse editor display are two bit planes corresponding to the mask (top plane) and data (bottom plane) sections of the pcur_form array. Use the left mouse button to plot and erase cells in these bit planes, creating your mouse form. Note that each time you plot or erase a cell, the pcur_form value corresponding to that row is displayed in the data window at the top of the screen. To examine the value of a row without changing a cell, move the cursor to the row and press the right mouse button.

There are three buttons at the bottom of the screen, labeled RESTORE, CURSOR, and EXIT. The RESTORE button clears any work you have done in the editor, letting you start over if you don't like your design. The CURSOR button executes a vsc_form( ) call, changing the actual mouse cursor to match your design. The EXIT button exits the application, and returns you to the desktop.

To compile Mouse Editor, enter the program into a file called moused.c, using Mark Williams MicroEMACS or equivalent editor. Then compile from the Mark Williams MSH shell $ prompt, as follows:

```
$ cc moused.d -laes -lvdi
```

The -laes and -lvdi switches serve to link in the required AES and VDI libraries. ■

MOUSE EDITOR (continued)

```
    there. When we use the v_rfbox() function to draw a filled
    box with rounded corners over the button, this results in
    the default solid fill pattern (all 1's) being XOR'd with
    the image of the button on the screen, turning all its black
    pixels white and all its white pixels black. Performing this
    operation on an inverted button causes the original button
    to re-emerge. On exit from the routine, we reset the write
    mode to its normal setting of "replace" (mode 1). Note also
    that we hide the cursor on entry to this routine and restore
    it on exit, preventing our graphic commands from damaging
    the cursor image.
*/

invert_button(array)
int *array;
{
    v_hide_c(handle);
    vswr_mode(handle,3); v_rfbox(handle,array); vswr_mode(handle,1);
    v_show_c(handle,0);
}

/*
    Convert cursor position to equivalent bit and word in
    bitmap. Use the XOR method, discussed above, to fill
    or clear the appropriate cell in the grid. Then set or
    reset the corresponding bit in pcur_form.
*/

set_bits(x,y)
int x,y;
{
    int p[4],bit,wrd;

    v_hide_c(handle,0);
    bit = (x - x_upper) / col_step;
    wrd = (y - y_upper) / row_step;
    p[0] = x_upper + bit * col_step;
    p[1] = y_upper + wrd * row_step;
    p[2] = p[0] + col_step; p[3] = p[1] + row_step;
    vswr_mode(handle,3); v_bar(handle,p); vswr_mode(handle,1);
    bit = 15 - bit; wrd += 5 - (wrd > 15);
    pcur_form[wrd] = pcur_form[wrd] ^ (1 << bit);
    v_show_c(handle,0);
}

/*
    Print the value of the newly-changed or requested element
    of pcur_form in the data window at the top of the screen.
*/

display_data(y)
int y;
{
    int row;
    char string[30];

    v_hide_c(handle);
    row = 5 + (y - y_upper) / row_step; row -= (row > 20);
    sprintf(string,"pcur_form[%2d] = %5u",row,pcur_form[row]);
    v_gtext(handle,x1 / 2 - 85,i2,string);
    v_show_c(handle,0);
}
```

ST HELP KEY ST HELP KEY ST HELP KEY ST HELP KEY

Tired of having to close and re-open a window when you switch disks? When you pop a disk out of any ST drive and insert another, you still see the directory for the old disk. Instead of closing and reopening the window, just tap the ESCAPE key. The new directory will read automatically.

ESCAPE will also clear text from dialog windows. For example, pressing the ESCAPE key in the date field on the control panel will clear the field and set the cursor at the beginnning so you can enter a new date. ■

The latest hardware and software announcements for Atari 8-bit and ST computers

New Products

GRAPHICS SOFTWARE

Aegis Development has announced *Aegis Animator ST* and *Aegis Art Pak 1* for the Atari ST.

Aegis Animator ST lets the user create instant animations. Objects can be drawn, moved around on the screen, and played back. Traditional cel animation can be done using pictures created with either *Neochrome* or *Degas* or taken from the *Art Pak 1* disk. "Metamorphic" animation can be created with 3-D rotation and other effects; once a polygon is created, it can be changed in shape, color, size, or location.

Aegis Art Pak 1 contains pictures of animals, cars, planes, tanks, helicopters, trees, backdrops, cityscapes, dinosaurs, and more for use with *Aegis Animator ST*.

Animator sells for $79.95, and *Art Pak* for $34.95.

Aegis Development, Inc., 2210 Wilshire Blvd. #277, Santa Monica, CA 90403. (213) 306-0735.

MISCELLANEOUS SOFTWARE

Gatorware offers a library of more than 800 user-developed programs on 100 disks. Owners of Atari 8-bit computers can choose programs from a dozen categories, including entertainment, GTIA graphics, education, communications, amateur radio, astronomy, home and business, and more. Disks sell for $5.00.

For a free catalog, send a self-addressed, stamped envelope to: Gatorware PD Software, P.O. Box 1215, Gainesville, FL 32602.

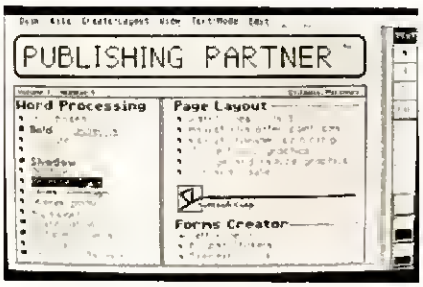
BOOKS

Abacus Software announces the newest volume in its ST Reference Library series, *ST Disk Drives—Inside and Out*. The book includes chapters on files, file structures, and data management. It discusses the floppy disk, the hard disk, and the RAMdisk from technical and progamming perspectives, and includes several utilities and program tools designed to help the user further explore ST disk drives. The book sells for $24.95.

Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510. (616) 241-5510.

PERSONAL/PROFESSIONAL PRODUCTIVITY SOFTWARE

SoftLogik Corp has announced the release of *Publishing Partner*, a desktop publishing program for the Atari ST. The program, which offers a complete on-screen representation of the printed page, is designed for professionals who want to produce high quality output of both text and graphics on their dot matrix and laser printers. It supports any Postscript compatible printer, including the Apple LaserWriter series, as well as most popular dot matrix printers.



Publishing Partner also permits users to adjust character size, character spacing, and line spacing and insert lines, boxes, circles, and patterns anywhere on the page. It sells for $149.95.

SoftLogik Corp, 4129 Old Baumgartner, St. Louis, MO 63129. (314) 894-8608.

Monogram Software has announced an Atari ST version of its *Dollars and Sense* personal financial management software. The program can be used to set up five financial record-keeping categories, including assets, liabilities, expenses, income, and checking, and will support unlimited transactions in each category. It can also be used to produce a wide variety of reports and graphs that can either be displayed on the screen or printed.

Dollars and Sense, which carries a suggested retail price of $99.95, is not copy-protected and supports hard disk operation. Two levels of on-line help screens are provided.

ST OneWrite Cash Disbursements from **Sierra On-Line** is now available for the Atari ST. Based the "one-write" or "pegboard" accounting system popular among small businesses, this check writing and bookkeeping program is the first module of a planned three-module system for the ST.

The program uses ST graphics to re-create the various checks, journals, and forms familiar to manual one-write users. It features an automatic error-checking system across appropriate distribution accounts and can quickly produce a cash disbursement journal, year-to-date vendor report, balance sheet, or cash-basis income statement.

ST OneWrite is not copy-protected and works with any dot matrix or daisy-wheel printer. Suggested retail price is $99.95.

Crystal Software has released the *PayDay* payroll program, the first in a series of accounting programs designed expressly for the Atari ST. *PayDay* and its companion general ledger, accounts receivable, and accounts payable packages were developed for small to medium sized businesses and offer documentation written for the novice user.

PayDay, which sells for $69.95, can handle an annual payroll of up to $21 million with up to 255 employees. It is menu-driven and offers on-line help. A built-in configuration utility allows the program to be adapted to the needs of businesses in any state.

Crystal Software, P.O. Box 803, Merlin, OR 97532. (503) 479-9516.

Plan Ahead from **Advanced Financial Planning** has been released for the Atari ST. Three modules—Retirement Planning, Life Insurance Planning, and College Funding—are integrated to allow sharing of data. All modules account for the effects of inflation throughout the planning period and offer printouts of budget statements, net worth statements, retirement plans, life insurance plans, savings plans, and college funding plans. In addition, year-by-year itemizations can be printed to show savings, income, expenses, and fund balances.

Pricing is per module as follows: any one module for $29.95, any two for $49.95, or all three for $59.95. All three modules can also be purchased for 8-bit Atari Home Computers.

Advanced Financial Planning, 20922 Paseo Olma, El Toro, CA 92630.

ENTERTAINMENT SOFTWARE

Sierra On-Line has released *Space Quest Chapter I: The Sarien Encounter* for the Atari ST, a computer adventure game that has a humorous theme and parodies recent science books and films. It is the first installment in a series of 3-D Animated Adventure games by Scott Murphy and Mark Crowe.

In addition to full-screen 3-D graphics and a full-sentence parser, the game offers many new features, including pop-up text windows that provide room for descriptions and other communications with the player. A status line provides continuous information on scoring, and multiple games in progress can be saved under detailed descriptions. The game comes on two 3.5″ disks at a suggested retail price of $49.95.

Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614, (209) 683-6858.

For Atari 8-bit Home Computers, **Strategic Simulations** has announced *Warship*. Almost every warship that fought in the Pacific between 1941 and 1945 is included in this game by Gary Grigsby. Players can choose from 79 classes of warships from the Allied or Japanese fleet, or modify ship data to create their own battleships.

Four scenarios are included (three historical and one hypothetical), and players can devise original maps to create ship-to-ship tactical surface engagements of their own. During combat, the computer keeps track of every shell hit and calculates damage based on such factors as armor strength, location of hit, and penetration ability of each shell. Suggested retail price is $59.95.

Also new for 8-bit machines from SSI is *Wargame Construction Set* for players who want to create their own war, science fiction, and fantasy games. Weapons and firepower, fighting units, and troop movement are some of the elements that players can control.

The package also includes eight predesigned scenarios, including battles from the Civil War and World War II, a contemporary hostage rescue, a futurist battle with alien forces, a medieval castle siege, and a World War III battle in Germany. Suggested retail price is $29.95.

Strategic Simulations, 1046 N. Rengstorff Ave., Mountain View, CA 94043, (415) 964-1353.

8-BIT BONANZA

RECREATION

STAR RAIDERS II, THE ADVENTURE CONTINUES! NOW AVAILABLE

DX5084	Star Raiders II	disk	$16.95
CXL4013	Asteroids	cart	$ 6.95
CXL4004	Basketball	cart	$ 6.95
RX8030	E.T.	cart	$ 6.95
CXL4024	Galaxian	cart	$16.95
CXL4012	Missile Command	cart	$16.95
CXL4027	Dix	cart	$ 6.95
CXL4008	Space Invaders	cart	$ 6.95
CXL4011	Star Raiders	cart	$ 6.95
CXL4006	Super Breakout	cart	$ 6.95
CXL4025	Defender	cart	$19.95
RX8042	Realsports Tennis	cart	$16.95
RX8044	Joust	cart	$19.95
RX8049	Jungle Hunt	cart	$19.95
RX8048	Millipede	cart	$19.95
CXL4022	Pac Man	cart	$19.95
RX8045	Pengo	cart	$19.95
RX8033	Robotron	cart	$19.95
RX8026	Dig Dug	cart	$19.95
RX8043	Ms. Pac Man	cart	$19.95
RX8067	Final Legacy	cart	$19.95
RX8029	Realsports Football	cart	$16.95
KX7101	Entertainer Kit	cart	$24.95
KX7102	Arcade Champ Kit (includes PacMan, Qix cart holder and two joysticks)	cart	$24.95

MUSIC SOFTWARE

FOR GRADES 7 THRUGH ADULT (available on disk only)

DX5081	**Music Painter** Transcribe your favorite songs and save them for later use, or compose your own songs and build a library of personal hits.	$19.95
AX2020	Music I (Theory Lessons)	$24.95
AX2026	Music II (Advanced Theory)	$24.95
AED80048	Music I/Term Notations	$ 6.95
AED80049	Music II/Rhythm and Pitch	$ 6.95
AED80050	Music III/Scales and Chords	$ 6.95
APX20100	Advanced Music	$ 6.95

MATH AND ARITHMETIC

The Secret Formula Series teaches mathematical concepts by asking the player to create formulas that will duplicate a series of numbers generated by the computer

Available on disk only

AED80020	Secret Formula—Elementary (grade 4–6)	$ 6.95
AED80021	Secret Formula—Intermediate (grade 6–8)	$ 6.95
AED80022	Secret Formula—Advanced (grade 9–12)	$ 6.95
AED80057	Basic Arithmetic (elem)	$ 6.95
AED80060	Counting (K–grade 2)	$ 6.95
AED80055	Metric & Problem Solving (grade 3–7)	$ 6.95
AED80009	Math Facts and Games (elem)	$ 6.95
AED80011	Division Drill (grade 7–9)	$ 6.95

FOREIGN LANGUAGE

CX4118	Conversational German	tape	$17.95
CX4119	Conversational French	tape	$17.95
CX4120	Conversational Spanish	tape	$17.95
CX4125	Conversational Italian	tape	$17.95

SPELLING, GRAMMAR, AND READING

CX4126	Speed Reading (grade 9–adult)	tape	$24.95
RX8059	Skywriter (grade 1–6)	cart	$17.95
AED80001	Spelling in Context/1 (grade 1)	disk	$ 6.95
AED80002	Spelling in Context/2 (grade 2)	disk	$ 6.95
AED80003	Spelling in Context/3 (grade 3)	disk	$ 6.95
AED80004	Spelling in Context/4 (grade 4)	disk	$ 6.95
AED80005	Spelling in Context/5 (grade 5)	disk	$ 6.95
AED80006	Spelling in Context/6 (grade 6)	disk	$ 6.95
AED80007	Spelling in Context/7 (grade 7)	disk	$ 6.95
AED80008	Spelling in Context/8 (grade 8)	disk	$ 6.95
AED80054	Prefixes (grade 3–6)	disk	$ 6.95
AED80059	Pre-Reading (K–grade 2)	disk	$ 6.95
AED80067	Spelling Bee (grade 3–7)	disk	$ 6.95
AED80069	Word Games (elem)	disk	$ 6.95
DX5050	Mickey, Great Outdoors (gr. 2–5)	disk	$ 6.95

PROGRAM LANGUAGES AND INSTRUCTIONS

KX7079	Logo Kit	cart	$49.95
CXL4018	Pilot Kit	cart	$39.95
AX2025	Microsoft Basic II	disk/cart	$29.95
CXL4003	Assembler/Editor	cart	$24.95
CX8121	Macro Assembler	disk	$24.95
CX4117	Invitation to Programming III	tape	$ 7.50
KX7099	BASIC Tutor (includes Invitation to Programming I & II and two books, Inside Atari BASIC and Programming Tips and Tricks)	tape	$19.95

SCIENCE AND SOCIAL STUDIES

The Atarilab series teaches science through experimentation.

AED80013	Atarilab Starter Kit	cart	$59.95
AED80014	Atarilab Light Module	cart	$39.95
AED80017	U.S. Geography	disk	$ 6.95
AED80056	The Marketplace (grade 3–8)	disk	$ 6.95
AED80052	Earth Sciences (grade 7–9)	disk	$ 6.95
AED80053	Geography (grade 4–10)	disk	$ 6.95
AED80066	Expeditions (elem)	disk	$ 6.95
CX8106	Bond Analysis (adult)	disk	$ 9.95
CX8107	Stock Analysis (adult)	disk	$ 9.95
CX8108	Stock Charting (adult)	disk	$ 9.95

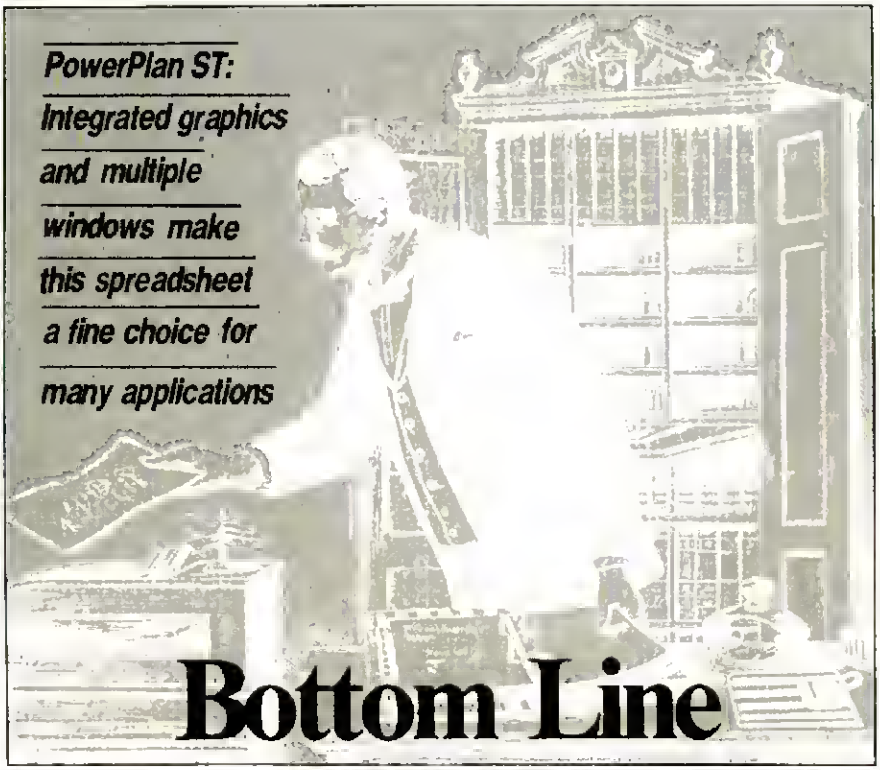
ATARI COMPUTER CONTROLLERS

CX21	Touch Pad Controllers (alpha numeric)	$ 9.95
CX30	Paddle Controllers	$ 9.95
CX40	Joystick	$ 6.95
CX75	Light Pen	$39.95
CX80	Trak Ball—HCD	$14.95
CX85	Numeric Keypad	$24.95

INK ROLLERS, RIBBONS, COMPUTER CABLES, AND ACCESSORIES

FC100626	Ink Rollers (NOW AVAILABLE)	$ 3.95	
CD70263	Ribbon for XMM801	$12.95	
CX87	Modem Cable for 850 Interface	$24.95	
CX86	Printer Cable for 850 Interface	$24.95	
CX853	16K RAM Module for 800 Computer	$19.95	
CX82	Black & White Monitor Cable	$24.95	

PowerPlan ST: Integrated graphics and multiple windows make this spreadsheet a fine choice for many applications



Bottom Line

By DAVID H. AHL

System: Atari ST
Price: $79.95
Summary: A fine spreadsheet package with excellent integrated graphics.
Manufacturer:
Abacus Software
P.O. Box 7219
Grand Rapids, MI 49510
(616) 241-5510

Although computers have been used for business and financial calculations almost from the day the first Univac was put into service in 1951, the concept of an electronic spreadsheet is fairly new. It did not exist until 1978 when Dan Bricklin, a student at the Harvard Business School sought a better way to perform the endless recalculations of balance sheets, income statements, and forecasts required whenever a single assumption changed. He likened his first spreadsheet to "an electronic blackboard and electronic chalk."

Bricklin's first spreadsheet program had five columns (four quarters and end of year) and 20 rows. To make it a more marketable product, he enlisted the aid of long-time friend Bob Frankston who increased the number of cells, added some user-friendly features, and packed the program into 20K for the Apple II. The program was christened *VisiCalc* and was said to be responsible for over half of the Apples sold in 1980.

The astounding success of *VisiCalc* spurred many other software vendors to market versions with more features, versions with special features for particular markets, and simplified, stripped down versions for the home market. By mid-1984 when *Creative Computing* did a roundup of all available spreadsheets, there more than 70 on the market. Today, *Lotus 1-2-3* is more-or-less the *de facto* standard, and only about a dozen other spreadsheets are being actively marketed.

The power *of a spreadsheet lies in its ability to manipulate data according to your directions.*

However, Atari ST owners have far fewer than a dozen spreadsheets from which to choose; three is more like it. The latest entry is *PowerPlan ST* from Abacus. *PowerPlan ST* is a full-featured spreadsheet with integrated graphics, built-in calculator, and online notepad. It takes full advantage of the GEM operating environment of the ST and thus can use multiple windows to display different parts of the spreadsheet, graphics, or notes.

We put *PowerPlan ST* through its paces using some real business problems. How do its features stack up when put to the test? Number of cells is always one of the first features cited by manufacturers, and Abacus is no exception; *PowerPlan ST* can have up to 65,536 cells, which seems plenty large for any business smaller than General Motors. We found it more than ample for our sample calculations.

Labeling

If you want to produce reports for anyone but yourself, layout and labeling loom as important features. Frequently, a spreadsheet will have long labels (titles) on columns at the left with shorter columns of numbers in the body of the table. This requires that column widths be able to be set independently, which *PowerPlan ST* allows. It is simple to specify a new column width using the pull-down Options menu; unfortunately once you do so, that new width stays in the column width buffer. The reason this is unfortunate is that if you change a few column widths and then want to make a second change to an already changed column, you have no way of knowing the current width unless you noted it someplace.

A cell is automatically defined as a label if the first character is non-numeric. This means that you must precede a label such as 1986 or 1987 with a non-numeric character like an apostrophe or asterisk. This is generally not onerous in the case of year labels, for example—but we found it more objectionable to add such a character to something like a parts catalog number.

Unlike some other spreadsheets, a label longer than the number of characters of a cell does not carry over into the next cell(s), even if they are empty. This is not necessarily a flaw; it just means that multi-column labels (titles, headings) must be produced by entering characters in several columns. Headings to appear at the top of a page can also be produced by putting the required type into the "notepad," a pull-down window for recording short bits of text. A nifty feature of the notepad is the ability to enter printer control characters which allow you to print bold, underlined, or italic characters.

The notepad is not designed as a word processor, but it does have some rudimentary wp operations, namely cut, copy, and paste. To move a block of text, for example, you cut it from one location and paste it into another. Although normally, you would use the notepad to print titles on a spreadsheet or graph,

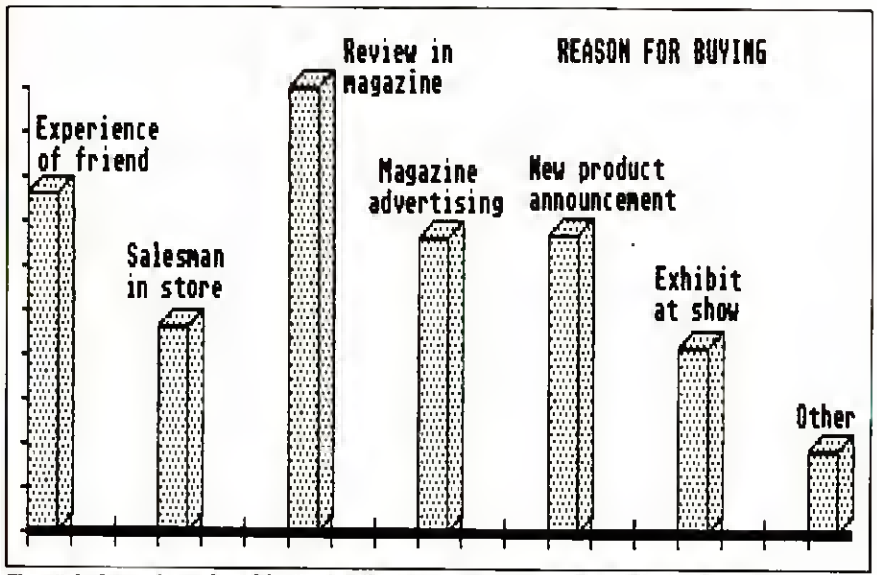


Figure 1. A graph produced by PowerPlan using Atari Explorer reader survey data.

you can also use it in the opposite manner, namely merging data from the spreadsheet into the notepad to produce short form letters or memos.

The Format menu allows you to select four types of numeric units: integer, decimal, units, or scientific. Units is the same as decimal except that it allows a one- to three-character label to be added to the number, called the unit (of measure). For example, units could be Frs, $, or %. Some spreadsheets allow cell entries to be centered or justified to the right or left; *PowerPlan ST* does not have this feature.

Formulas and Functions

The power of a spreadsheet lies in its ability to manipulate data automatically according to your directions. However, spreadsheets vary widely in the way they require you to enter these directions. In specifying cell coordinates, *PowerPlan ST* uses the Microsoft *MultiPlan* convention—row and column numbers are preceded with R and C (R4C2, R23C45). A cell can also be referred to relative to another cell. For example, the value of the cell two rows above the current cell would be expressed as R-2C+0 (row minus 2 and same column).

No matter which cell adressing system you choose to use, you must be cautious when inserting or deleting rows and columns. While some spreadsheets will automatically adjust all cell references after an insertion or deletion, *PowerPlan ST* is not one of them. Thus, it is highly desirable to plan out your spreadsheet as fully as possible before committing it to the computer.

Looking at the functions available in a spreadsheet, you can usually put it in either the business/financial, statistical, or scientific camp. *PowerPlan ST* is clearly in the last category with its 13 trig and log functions and 11 general functions (sum, average, maximum value, etc.). Indeed, the program has no financial functions such as net current value or rate of return, and no statistical functions. Nevertheless, it can be used for standard business and financial planning.

Other things we look for in a spreadsheet are its ability to replicate rows, columns, or blocks of data, and the ability to sort rows and columns. *PowerPlan ST* did not disappoint us; it has all of these capabilities and more. We did note that *PowerPlan ST* can sort on only one field at a time; thus to sort on two or more variables, you must first sort the least important and work your way to the primary variable.

PowerPlan ST allows you to use up to seven windows, which is four more than most people would normally need. One delightful feature of multiple windows is the ability to keep a portion of your spreadsheet in view on part of the screen and one or more graphs in view on other parts of the screen. As you change a cell value, you can vividly see the effect of the change in living graphics and color.

Graphics

Speaking of graphics, *PowerPlan ST* allows you to display a spreadsheet range in four different types of graphs (with three additional variations): bar, stacked bar, line chart, and pie chart. Variations include 3-D bars and a shaded line chart.

To specify a range of numbers for graphics, printing, or replication, you must move the cursor over the upper left-hand corner of the range, press and continue to hold the left mouse button while you move the mouse to the cell in the lower left-hand corner of the range, then release the button. With a small range, entirely visible in the active window, this is easy. With a large range, it is darn near impossible. A second method of specifying a range with the shift key and mouse button is somewhat easier for large ranges, but why oh why couldn't Abacus have included an option to allow you simply to type the cell coordinates of the upper left and lower right corners of the range?

PowerPlan ST has a versatile print mode that allows you to print out selected cells, the graphics window, the notepad, or the scrapbook (a temporary storage area). Graphics can be printed on Atari and Epson-compatible printers.

Figure 2.

```
Titles can be bold
or just normal type.
```

The Bottom Cell

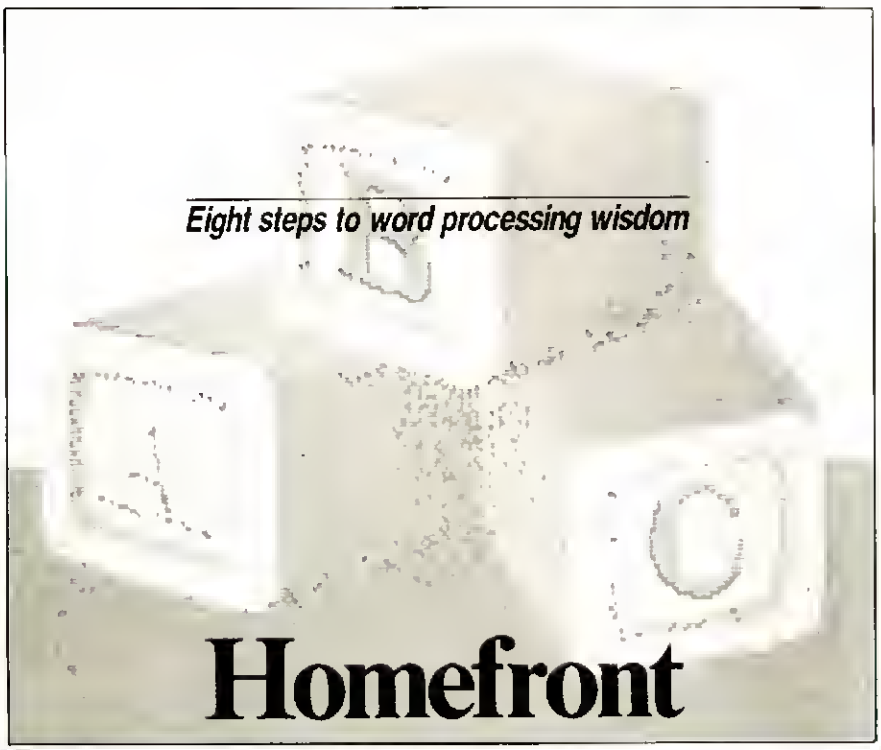
Different users will have different opinions of *PowerPlan ST*. For smaller problems, it is more than adequate. However, as the size of your spreadsheet grows, *PowerPlan ST* becomes sluggish—not, surprisingly, on calculations, but on data entry. For some reason, each time you press the Return key to enter a value, *PowerPlan ST* scans the entire spreadsheet from the upper left-hand corner down to the active cell, something you will soon grow tired of watching.

The graphics in *PowerPlan ST* are outstanding, and with the delightful simultaneous display of numbers and graphics you can get an immediate visual grasp of the effect of different assumptions much more easily than by looking at numbers alone.

Although *PowerPlan ST* has no financial functions per se, it is still a powerful tool for keeping track of budgets, expenses, and other business data; after all, how often do you *really* need to calculate rate of return or net present value?

PowerPlan ST comes with a 72-page manual which, if you have never used a spreadsheet before, may turn out to be a bit cryptic. Moreover, the index is totally worthless. However, once you get the hang of using the program, the manual is quite adequate.

With its excellent integrated graphics, *PowerPlan ST* is a fine spreadsheet that should be adequate for most users. And with its price of just $79.95, it certainly conforms to the Atari tradition of "power without the price." ■



Eight steps to word processing wisdom

Homefront

By ROXANE FARMANFARMAIAN

An empty screen can destroy your hopes of writing faster than anything else in the world . . . besides a blank piece of paper, of course. Ditto for a keyboard and a No. 2 pencil. Whether you stand at the threshhold of a promotional letter or a birthday greeting, a school report or a resume, if you ain't got the ideas, the tools are worthless.

But when your creative juices are flowing, then . . . though tools be tools, some are more equal than others. Used effectively, your word processor can knock the spots off any paper/pencil combo.

What's effective? For starters, not thinking of the screen and keyboard (and printer) as surrogate paper and pencil. Start at the top, type to the bottom, reread, start from the top again and move down, correcting your errors—that's one way of writing. But your Atari can help you do so much more!

The computer gives you the power to manipulate text visually By copying, moving, and temporarily banishing text to holding areas, you can mix and match sentences (and paragraphs) into different designs. If your word processing program gives you the benefit of windows, so much the better; they let you bounce text back and forth between on-screen files. If you don't have windows, you can still benefit from the flexibility your Atari offers by splitting your screen into upper and lower parts, while making full use of your buffer as a hidden window. Here's how to turn your phrases into building blocks, rather than letting them languish as if they were cemented in place.

The Steps

1. Regardless of what you are planning to write, take the time to put notes and ideas into a word processor file. Even if you only do so right before settling down to the real task of writing, throwing ideas into a catch-all notes area will help you double-check later to be sure that you have covered all the points you planned to cover.

If, in the course of writing, you think of new ideas, particularly ones that don't fit in with what you have written so far, put them in the notes area as a reminder to deal with them later. When collecting a lot of notes, use boldface or underlining to highlight important words and concepts. This makes it easier to zero in on common ideas and collect related ones when it comes time to organize the notes, later on.

Before beginning to write for real, think of subject headings. Then, using your block move or cut-and-paste commands, reorganize your notes under the headings. For this column, I chose "introduction," "smart steps," "tricks," and "conclusion." If your notes don't fit together as well as you had hoped, try new headings or rearrange them. The time to discover and correct organizational flaws and sloppy thinking is at the beginning, before the purple prose starts flowing. It is often helpful to make a hardcopy at this stage for reference.

If you are doing a research paper, this process could take some time. At first, just move the notes among the headings until you have them where you want them. Then, if you wish, juggle the notes under each heading into a more workable order. Scan your notes to see if you have left any holes in your research, and fill them now—or at least figure out how to write around them.

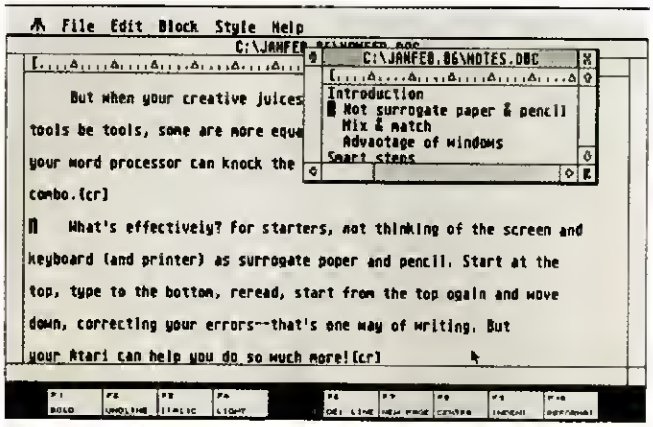
2. From organized notes to finished opus is not a huge step. If you are using a windowed word processor like *1ST Word* on the ST, open a new file on-screen in which to do your actual writing. Having notes and text on-screen at the same time makes things very easy.

If you don't enjoy the luxury of windows, drop down six or seven lines below your notes (in the same file) and start writing there. To facilitate bouncing back and forth between your notes and your emerging text, mark this position with a brief, distinctive series of characters (***, for example). Having done so, you will be able to use the "move to top of document" function of your word processor to visit your notes, and jump back to your text by using its "search" function to seek out your distinctive marker.

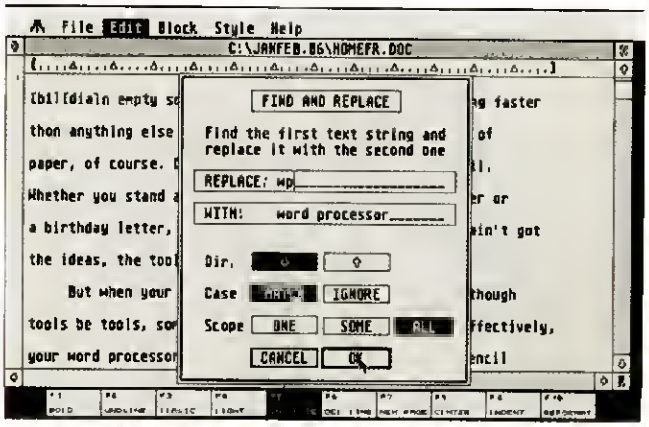
Glance at the notes in the window (or section) under your first heading, and then take the plunge and start writing. Whenever appropriate, copy notes from the note window into your text, rephrasing as you go. If the blank text window gives you the heebie-jeebies, copy all the notes from your first heading into the empty window and write around them, reworking them into more complete ideas and sentences as you go.

3. When you reach the end of your piece (or, if it is a long endeavor, when you start slowing down and need a break), save your files and print out a copy of your document. If your text is in its own window, as a separate document, this should be easy. If it is attached to your notes, check your word processor manual to see how to go about printing only a portion of a file. For most word processors, this is fairly simple.

Seeing your words on paper is always different (and more revealing) than seeing them on-screen. Reading fluidly from beginning to end in the hardcopy also helps you avoid the trap of seeing text in screen-lengths, which can make for very choppy copy. Don't look for spelling errors or minor flaws in grammar at this stage. Look for large-scale



Place your notes in a separate window or section of the document before you begin to write, and refer to them frequently as you write.



Use abbreviations for unwieldy, frequently-used words and phrases. Then use a global search-and-replace to substitute the complete word or phrase when the document is finished.

problems—inconsistencies in logic, abrupt changes in tone, insufficient factual material to support your argument, confusing progressions of ideas—and mark them on the printout.

4. When your hardcopy siesta is over, it's back to the screen. If you haven't completed your piece yet and you are the type that prefers getting all your ideas down before starting to revise, continue writing until you're finished. Otherwise, start revising from the top, incorporating the changes you made on your printout. Check spelling and grammar as you go along.

While moving through the text, go back to your note window periodically, deleting the notes that have been adequately covered (remember, before doing so, to save a copy of your original notes for later reference). By doing this, you will discover if you have accidentally missed something important. You will also find out if you have strayed, in writing, from the structure you originally planned. The latter discovery doesn't necessarily mean your piece is bad. However, if you aim to write like a professional, you should ask yourself if there was a good reason for each deviation. Understanding the way you think while planning and how that differs from the way you think while writing will give insight into the writing process and improve your writing overall.

Shortcuts

Professional knowhow, habitually used, can save you a great deal of time and reduce the repetitive aspects of writing. Try the following.

1. If you regularly write pieces with the same logical format (for example, monthly business reports that must always include summaries for the same group of departments) set up task-specific outline files with labeled sections already in place. Load these into your "notes" window for a time-saving boost to the organizing process, so you can concentrate on what is important rather than worry if "Receivables" comes before "Research." Remember to save your filled-in outlines under appropriate new names, so as to leave your blanks free for future use.

***Used** effectively, your word processor can knock the spots off any paper/pencil combo.*

2. The same principle applies to "boilerplate" text you use over and over. If, for example, you use your Atari to send out descriptive contracts for your consulting business, chances are that each document will contain too much unique information to make use of a mail-merge program and fully standardized form letter a practical solution. On the other hand, it is more than likely that substantial portions of each contract will remain unchanged. Simply place this "boilerplate" text in an empty file and write around it to create each new document. Or load it into a separate window and cut-and-paste it into the window you are using.

3. If you are writing a long piece, use abbreviations for unwieldy, frequently-used words and phrases throughout your first draft. Make the abbreviations easy to type, so you can slip unharried into the habit of using them while you write. After you have finished doing the heavy creative work, you can go back and do a global search-and-replace for each abbreviation, substituting the complete phrase. If you consistently misspell certain words, you can handle these the same way.

4. Users of word processors with windows have another option: putting help screens or abbreviation lists in windows for fast reference. You may, for example, have developed a great system of abbreviations (or function-key assignments, or macros, etc.) but tend to forget which is which. Placing the definitions directly in front of you, but unobtrusively, somewhere in the corner of the screen, for example, can save you a lot of time and brain racking.

To Sum It All Up

No doubt you will discover your own tricks and acquire your own habits as you work the keyboard. Because of that, you will come to think of your word processor as far superior to anyone else's—everyone does. Don't let that stop you from trying on your word processor any neat trick that you see someone else using on his. Every word processor is unique, just as every writer is unique. But many of the steps to good word processing—and good writing—are universal. ■

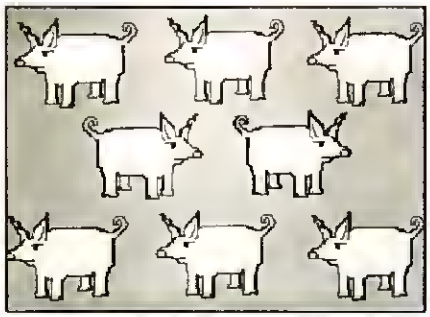
Roxane Farmanfarmaian is technology editor of Working Woman magazine.

Puzzles & Problems

By DAVID H. AHL

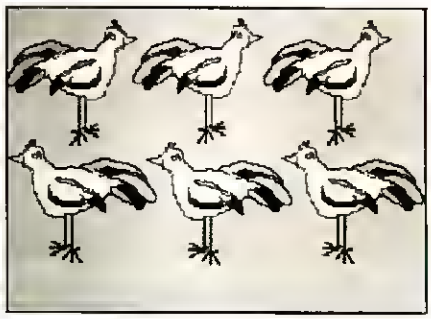
Some of these problems can be solved in your head, some require pencil and paper, and still others require that you write a computer program.

Answers are on page 77.



Count Closely

A city boy saw a farmyard in which pigs and chickens were freely roaming together. He asked the farmer, "How many pigs and chickens do you have?" The farmer replied, "Well, I count 60 eyes and 86 feet. You figure it out."



People Express

A People Express plane flies from Newark to Buffalo and back. There is no wind, and the pilot maintains a constant speed equivalent to a ground speed of 400 mph. The same trip is made the next day at the same engine speed, but there is a constant 50 mph wind blowing from Buffalo to Newark. Will the round trip take more, the same, or less time than the day before?

How Old?

Last year my age was a square number. Next year it will be a cube number. How old am I now? How long will I have to wait before my age is both a square number and a cube?

Perfect Numbers

A *perfect number* is an integer, the sum of whose integral factors (including 1) equals itself. The first number is 6, a sum of 1 + 2 + 3. Find the second and third perfect numbers.

Broken 1000

Two numbers add up to 1000. One number is a multiple of 19, the other is a multiple of 47. Find the two numbers.

Orderly Remainders

Find the smallest number that when divided by 10 has a remainder of 9, when divided by 9 has a remainder of 8, when divided by 8 has a remainder of 7, and so on right down to division by 2 leaving a remainder of 1.

The Remaining One

Find the smallest number that is divisible by 13, but when divided by 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, or 2 leaves a remainder of 1.

Same Numbers

What six-digit number when multiplied by any number from 2 through 6 produces answers, all of which contain six digits in the same sequence. ■

Length of a Lunar

The moon creatures described by H. G. Wells live in underground caverns and use the *lunar* as their unit of distance. It was adopted because the surface area of the moon in square lunars exactly equals the volume of the moon in cubic lunars. The diameter of the moon is 2160 miles. How long is a lunar in relation to a mile?

Mountain Climber

A man climbs a mountain one day, reaches the summit in early evening, and camps there for the night. He goes down the next day using the same route by which he climbed up. Is there a spot along the route that he will occupy at precisely the same time of day on both trips?

An Introduction to MIDI

Part 1: A nuts and bolts guide to MIDI

Sound Chip

By JOHN JAINSCHIGG

I wrote a first draft of this column while quitting smoking, which apparently did something to my brain. Dig this: "The idioms of musical notation, quarter notes, halftones, measures, scales, and so on, comprise a language of numerical proportions and orderly mathematical relationships. Though music—as we hear it—is a phenomenon that unfolds with great complexity and subtlety over time, man has always recognized it as a form of information that can be decomposed to number."

You don't *really* want to read parts of my dissertation, do you? Neither do I, now that my brain chemistry has settled down. Assuming you don't have any metaphysical trouble with the idea of using computers to create art, the connection between music and computing is really very simple. Music is a form of information that can be dealt with numerically. Computers can be very, very useful tools for dealing with numeric information. They also keep good time, never bring their groupies to rehearsal, don't get into arguments with the producer about billing the record company for pharmaceuticals, and never, never go off between tours to make self-indulgent, derivative, solo albums.

MIDI —the Musical Instrument Digital Interface—is (among other things) a way of getting computers and "smart" musical instruments to talk together. By 1981, musical instruments (like wristwatches, pocket calculators, VCRs, and the passenger tram at Dallas/Fort Worth International Airport) were getting too smart for their own good. Microprocessors are kinda like a fertilizer, you know: throw a processor into something, and it starts sprouting features and peripherals all over the place.

MIDI is ***a way of getting computers and "smart" musical instruments to talk together.***

The problem back then was that everybody's microprocessor-enhanced synthesizers, drum machines, sequencers, and so on, didn't speak the same language. Musicians who owned systems from different manufacturers couldn't share resources. Recording studios were forced to invest vast sums of money in redundant equipment, just to stay compatible with everything their customers would trot in.

It was a stone drag. To repair the situation, Dave Smith (president of Sequential Circuits) and his colleague Chet Wood proposed a network specification called Universal Synthesizer Interface at the autumn Audio Engineering Society convention in New York. Interest among manufacturers ran high. By 1982, representatives of Sequential, Kawai, Korg, Roland, and Yamaha had reached concensus on an improved version of USI, eventually codified by Smith and Wood as MIDI 1.0.

You know the old saying: "a camel is a horse designed by committee?" Surprisingly, the MIDI standard resembles a camel not at all. (Atari ST Developer's in-joke: nor does it resemble a cabbage patch, or, for that matter, a garbage can.) Anyone who has hung around the Akihabara district of Tokyo for a few years will have no difficulty understanding it.

Don't panic! I'm just kidding. Actually, the MIDI system is admirably simple—if you already know telecommunications and maybe some assembly language, you'll find it very easy to pick up. Once you've done so, you will have catapulted yourself onto the leading edge of music technology—way, way over the curly heads of those metal freaks who got all the cute girls in high school. So let's get down to it, and remember—if your courage flags—that Christy Brinkley married Billy Joel.

How MIDI Works

The MIDI specification describes some simple hardware that lets machines communicate. It also defines a low-level "language" that describes musical "events," mostly in the context of electronic keyboards, but adaptable to other kinds of electronic instruments and equipment as well.

The MIDI transmission circuit (MIDI OUT) consists of a UART (Universal Asynchronous Receiver/Transmitter) and line driver; the receiver circuit (MIDI IN) of an optoisolator, similar UART, and some other basic components. An optional transmission circuit, MIDI THRU, is sometimes also provided (see below)—this is unimplemented on the ST, but may be present on MIDI interface units available for 8-bit Ataris. Schematics for the circuit (and other hardware documentation) are available from the International MIDI Association, 11857 Hartsook St., N. Hollywood, CA 91607.

Basically, the transmission circuit accepts data from the computer hardware and spews it out, bitwise, along a wire, in the form of voltage pulses. Bits are sent down the wire in packets of ten, each comprised of a *start* bit (meaning "here comes some data"), eight *data* bits (a binary byte), and a *stop* bit (meaning "that was it"). Because the bits are sent in series, MIDI is said to be a *serial* communications system. Because the start and stop bit markers help receiving units keep track of where

When he's not busy being senior technical editor for Atari Explorer, John Jainschigg plays guitar and keyboards with his band, "Landlord's Halo." So does his ST. His Atari 800 is too stuck up to join the group—having tasted fame back in '84 as the first home computer ever featured on MTV.

meaningful data begins and ends, eliminating the need for separate "synch" messages and other timing rigamarole, MIDI is said to function *asynchronously*.

The bits in a MIDI message are sent down the wire at intervals of $^1/_{31250}$ of a second. The MIDI interface is thus capable of transmitting at 31.25K bits per second, or about 3125 bytes or characters per second. Fast like giraffe.

Hooking Up to MIDI

Most MIDI-compatible devices can both receive and transmit MIDI data. In accordanee with the MIDI spec, a separate, female 5-pin DIN connector is provided for each function; one labeled MIDI IN, the other MIDI OUT. A third connector, labelled MIDI THRU, is also provided on some equipment. MIDI THRU is slaved to MIDI IN and simply passes on a eopy of all data received. This permits the unit to aet as a passive link in a connection between two other pieces of MIDI equipment. Together, the three ports let you assemble MIDI-eompatible equipment into complex networks.

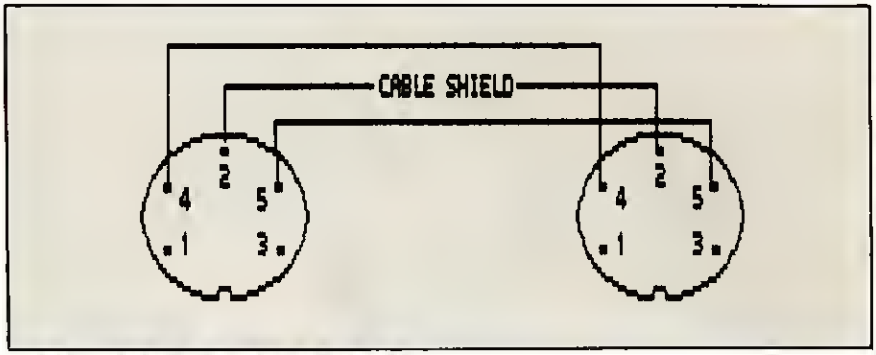


Figure 1. Schematic for standard MIDI cable. Shielded, twisted-pair cable should be used, with shield connected to pin 2 at either end.

All connections between MIDI devices are made with "male-both-ends" DIN cables, which ean be purehased ready-made or put together according to the schematic in Figure 1.

MIDI eables ean be up to 50 feet long, according to the spec, though stadium-rock superstars of my acquaintanee have experienced little trouble with cables up to twice that length. (If you're worried about running cables over longer distances, consult your tour engineer or booking agent. The former can probably whip up the neeessary line-drivers and junction boxes; if not, the latter can book you into smaller halls.)

A basic MIDI connection is made by cabling the MIDI OUT port of one device to the MIDI IN port of another, enabling the first device to transmit data and the second to receive it. To communicate both ways (assuming both devices can receive and transmit), a second cable is used to connect the MIDI OUT port of the latter device to the MIDI IN port of the first.

Why isn't all this I/O combined into a single port? The most important reason is that with clearly-labeled, one-function ports on all devices, it is fairly easy to keep track of where data is coming from and going to in a complex MIDI setup.

MIDI Communications

So far, our description of MIDI hasn't been very musical. In fact, what we've described is just a very simple, high-speed serial communications system. That's exactly what MIDI is on the hardware level. In fact, the ST MIDI ports are being used for non-musical applications ranging from file transfer to multiuser networking.

MIDI is device #3 under the ST system (device #1 is the RS-232 (aux:) port, device #2 the eonsole). The MIDI IN port can be read using the ST Basie statement

```
B = INP(3) AND 255
```

where 3 is the device (aetually port) number. The expression AND 255 masks off the high byte of the word value returned. Writing a byte of data to the MIDI port is done with the statement

```
OUT 3,B
```

where 3 is the port number, and B is your one-byte value.

Listing 1 is a short Basic program that will let two STs communicate via their MIDI ports. To make the hookup, use two MIDI cables to connect the MIDI OUT port of one ST to the MIDI IN port of another, and vice-versa.

Puzzles & Problems Answers

Length of a Lunar

A lunar is 360 miles long.

Count Closely

There were 13 pigs and 17 chiekens.

People Express

Because the wind boosts the speed of the plane in one direction and retards it in the other, it might be thought that these effects would eancel each other out and that total travel time would be the same, wind or no wind. Actually, this is not the ease, because the time during whieh the speed of the plane is boosted is shorter than the time during which it is reduced. Thus, the round trip in the wind is longer.

Mountain Climber

The answer is yes, but the problem is not easy to solve unless you think of two people making the ascent and descent on the same day. Obviously, they must meet; thus, the problem is solved.

How Old?

My present age is 26. In 38 years, when I am 64, my age will be both a square and a cube.

Perfect Numbers

The seeond perfect number is 28; the third is 496.

Broken 1000

The two numbers are 342 and 658.

Orderly Remainders

The number is 2519.

The Remaining One

The number is 83161.

Same Numbers

Original number: 142,857.
Multiplied by 2: 285,714.
Multiplied by 3: 428,571.
Multiplied by 4: 571,428.
Multiplied by 5: 714,285.
Multiplied by 6: 857,142.

```
9   REM --ENLARGE AND CLEAR OUTPUT WINDOW--
10  FULLW 2:CLEARW 2
19  REM --TEMPORARILY DISABLE GEM--
20  POKE SYSTAB+24,1
29  REM --CHECK FOR KEYPRESS--
30  IF NOT INP(-2) THEN 70
39  REM --INPUT KEY CODE--
40  C=INP(2) AND 255
49  REM --END IF USER HAS PRESSED <ESC>--
50  IF C=27 THEN POKE SYSTAB+24,0:END
59  REM --OUTPUT CODE TO MIDI PORT--
60  OUT 3,C:GOTO 90
69  REM --CHECK FOR DATA AT MIDI PORT--
70  IF NOT INP(-3) THEN 30
79  REM --INPUT CODE AT MIDI PORT--
80  C=INP(3) AND 255
89  REM --RE-ENABLE GEM AND PRINT CODE--
90  POKE SYSTAB+24,0:PRINT CHR$(C);:GOTO 20
```

Listing 1. This ST Basic terminal program permits two STs to communicate via their MIDI ports.

```
#include <osbind.h>

main()
{
  int c = 0;
  /* loop forever */
  while(1){
    /* if a key has been pressed ... */
    if (Bconstat(2)){
    /* input it, and exit if it's a CTRL-C */
    if((c = Bconin(2)) == 3) break;
    /* else print it */
    Bconout(2,c);
    /* and output it over MIDI */
    Bconout(3,c);
    }
    /* if there's data at the MIDI port ... */
    if (Bconstat(3)){
    /* get it */
    c = Bconin(3);
    /* and print it */
    Bconout(2,c);
    }
  }
  /* exit politely on break */
  exit(0);
}
```

Listing 2. Mark Williams C version of the MIDI terminal progam in Listing 1.

Then RUN the program on both machines.

In C, reading and writing to the MIDI ports is just as simple. At the lowest level, the BIOS functions Bconstat(3), Bcostat(3), and Bconin(3) and Bconout(3,c), defined in <osbind.h> can be used as shown in Figure 2, where c is an integer.

Most C environments also offer the higher-level function midiws(s), which writes the null-terminated string pointed to by s (minus the trailing *0) to MIDI out. There is no corresponding input function. Though standard I/O functions can sometimes be used in special contexts, it is impractical to handle normal MIDI input except on the character level.

Listing 2 is a C version of the dumb MIDI terminal program described above. Written in Mark Williams C, it should compile with few changes under other versions.

Next issue, we'll write some more complicated and useful MIDI applications. For now, however, let's move up to a more abstract level and study some electronic instrument vocabulary.

Synthspeak

To understand MIDI language at the bits and bytes level, you have to have at least a passing familiarity with the way a modern electronic instrument works. Basically, it is a computer optimized to produce sound. There's a CPU, some ROM, some RAM, various input devices (a keyboard, some buttons, slider switchers, foot pedals, pitch benders, or other controls), and various output devices (LED indicators, maybe an LCD screen, the audio output ports or built-in speakers, and, of course, the MIDI ports). The block diagram in Figure 3 describes the various parts of a Casio CZ-101, an affordable MIDI synthesizer. Looking at it, you should feel a warm sense of familiarity. If you're still not

c = Bconstat(3);	Returns −1 when a byte is waiting to be read at MIDI IN, 0 otherwise.
c = Bcostat(3);	Returns 0 when MIDI OUT is free to transmit, −1 otherwise.
c = Bconin(3);	Returns a word (high byte set to FF) from MIDI IN. Will hang until data is available.
Bconout(3,c);	Writes low byte of c to MIDI OUT. Will hang until data can be written. Returns nothing.

Figure 2.

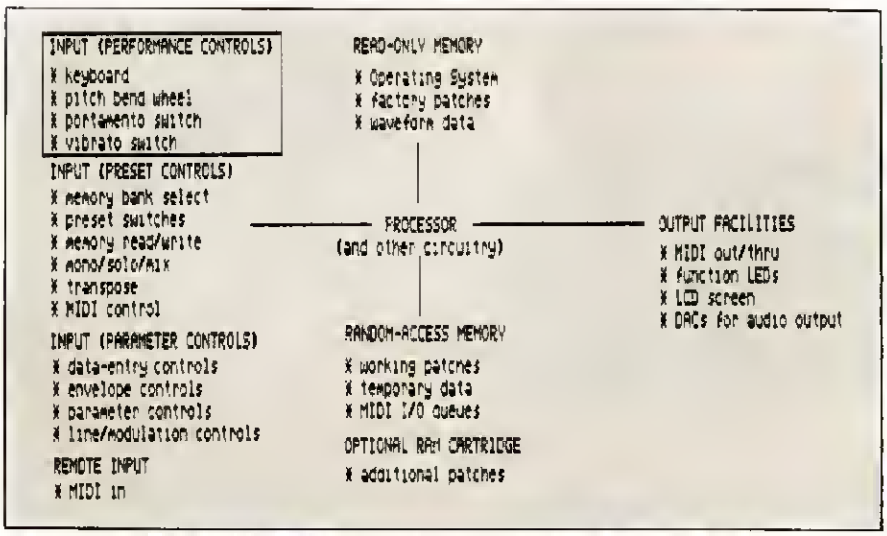


Figure 3. Simplified block diagram of a Casio CZ-101, a typical MIDI synthesizer.

***On certain** synths, controllers may be reassignable, like function keys.*

warm enough, imagine how those metal-heads must feel when they look at this kind of diagram and realize what they're getting into.

Note the boxed area at the left of the diagram—these are the controls you'll use most often when playing the instrument. If you think about it, you'll see there's only a conceptual connection between manipulating these controls and actually making sounds.

In fact, the CPU interfaces the controls to the sound synthesis facilities in real time, changing controller-motion information to music (and causing other things to happen as appropriate) according to a program. Parts of this program are inalterable—like the parts of an OS that are burned into ROM (in fact, they *are* parts of an OS, and they *are* burned into ROM). Other parts are user-alterable.

Depending on how the system is designed, the processor may monitor (poll) certain of the controls constantly to see if anything is happening to them. Certain other controls may not require constant monitoring, but may generate interrupts to attract the processor's attention when they require it. Like computer controllers (joysticks, mice, the keyboard, etc.), each synth controller generates its own type of data that must be interpreted and acted on in special ways.

The keyboard is apt to be the most expressive controller in the system. At the very least it will be capable of informing the processor when a key is pressed and when it is released. On more expressive synthesizers (not the CZ-101), the keyboard may also signal how fast each key is pressed down (*attack velocity*), how hard it is being held down (*pressure*, or *aftertouch*), and how fast it is permitted to rise (*release velocity*).

This can represent a lot of information—usually one reading for attack velocity, perhaps several for pressure (it may change over time), and one reading for release velocity. Having all this information permits the synth to respond eloquently, modifying the character of sound produced throughout the press-hold-release cycle.

Additional "performance" controls (dials, joysticks, touch strips, sliding switches, mouthpieces, foot pedals, and buttons) may also be present. These controls are used to modify aspects of the synthesizer's sound—pitch, volume, reverberation, vibrato, etc.—as the instrument is being played: *Continuous* controls, like dials and sliders, generate a range of values corresponding to position (like a paddle controller or a mouse). *Switch-type* controls, like buttons, simply signal "on" or "off." One common continuous control is the *pitch bender*, usually a dial or joystick, used to raise or lower temporarily the pitch of notes being played at the keyboard (much as a guitarist varies the pitch of a note by "bending" (stretching) a sounding string).

Preset controls are buttons (usually) which let you alter your synthesizer's behavior in certain prearranged ways. They include the buttons that let you switch from one overall sound effect to another (patch selectors—so called because on old-fashioned synthesizers, sound effects were created by "patching" oscillators, filters, and other components together with cables). Depending on configuration options available in the synthesizer in question, other kinds of preset controls may also be present.

Parameter controls are used to design and modify the various sound effects a synthesizer is capable of producing. The appearance of such controls varies widely from one brand of synthesizer to another. Their functions vary just as widely, depending on the method of sound synthesis the instrument employs.

The kind of controller information we've just discussed—position settings, button presses, pressure readings, and so on—is what's encoded in the MIDI language and transmitted over a MIDI system. In addition, certain other messages can be sent, among them clock readings, reset commands, and online status flags. Note, however, that among all these different kinds of data, there's not a pitch in sight—it's all real low-level stuff that's comfortably computery.

Next issue, we'll continue our rundown of electronic keyboard functions, review the actual syntax of MIDI, and program a MIDI analyzer/assembler. Meanwhile, put on a good Metallica side, crank it up, and play some air guitar. Metal lives! ■

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